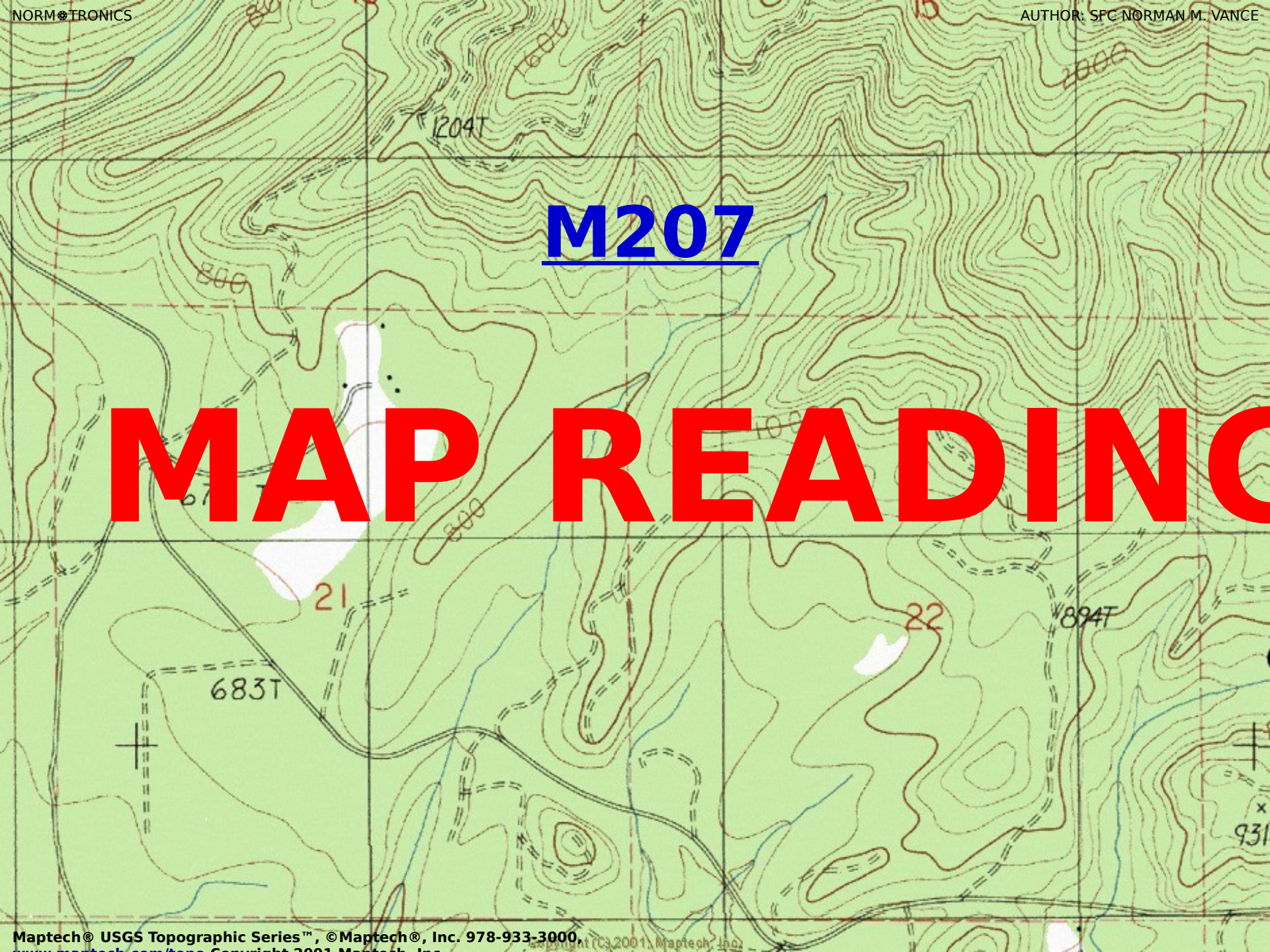
AUTHOR: SFC NORMAN M. VANCE

M207

MAP READING



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ENABLING LEARNING OBJECTIVE #8

ACTION: DETERMINE POLAR COORDINATES.

CONDITIONS: IN A CLASSROOM ENVIRONMENT GIVEN A 1:50,000 'TENINO'MAP SHEET AND GTA 5-2-10 COORDINATE SCALE.

STANDARDS: IN ACCORDANCE WITH FM 21-26.

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POLAR COORDNATES

- PLOT AZIMUTH FROM A KNOWN POINT.
- PLOT DISTANCE FROM THE KNOWN POINT ALONG THE AZIMUTH LINE.
- THE POLAR COORDINATE IS AT THE END OF THE AZIMUTH/DISTANCE LINE.

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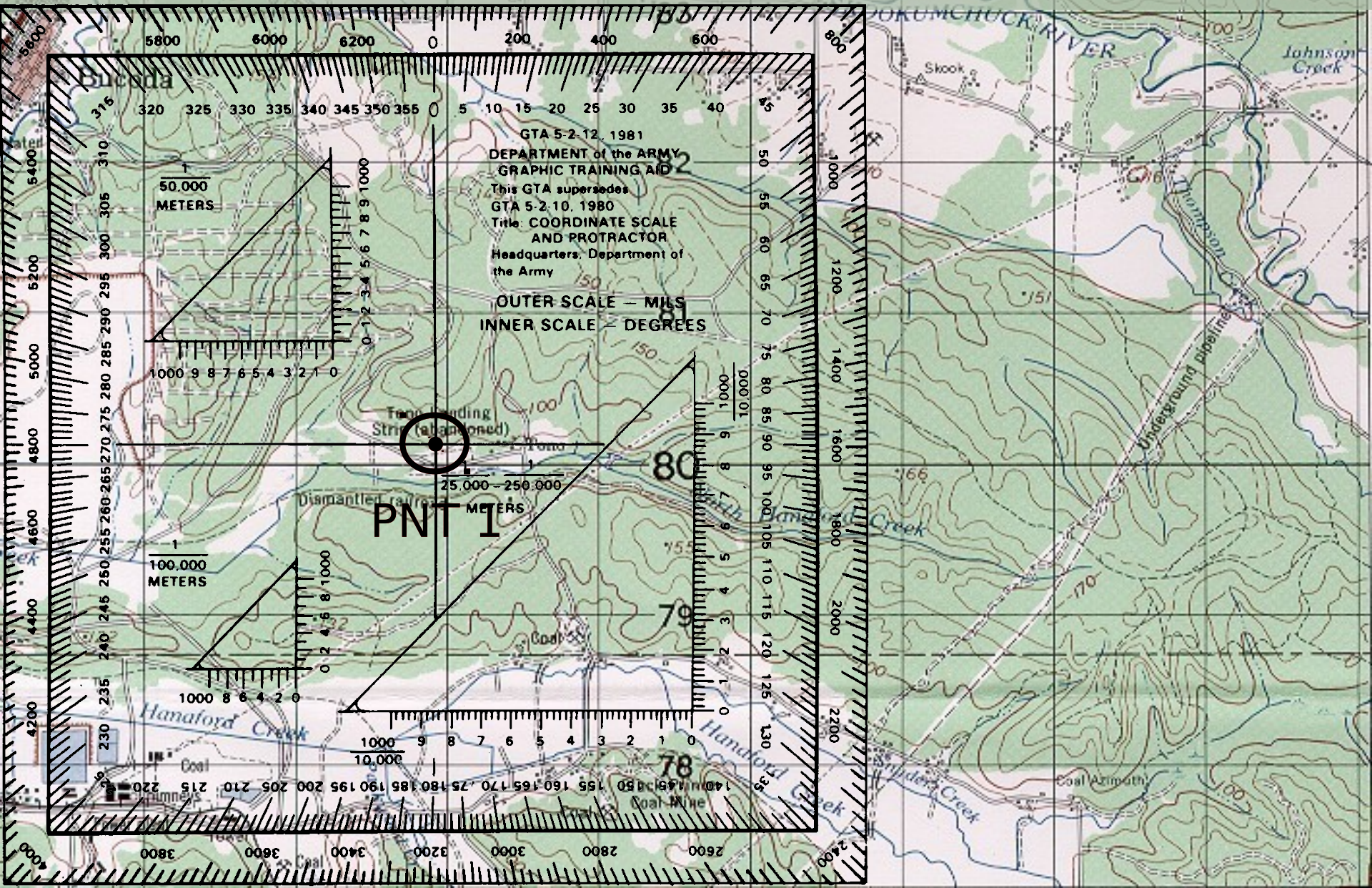
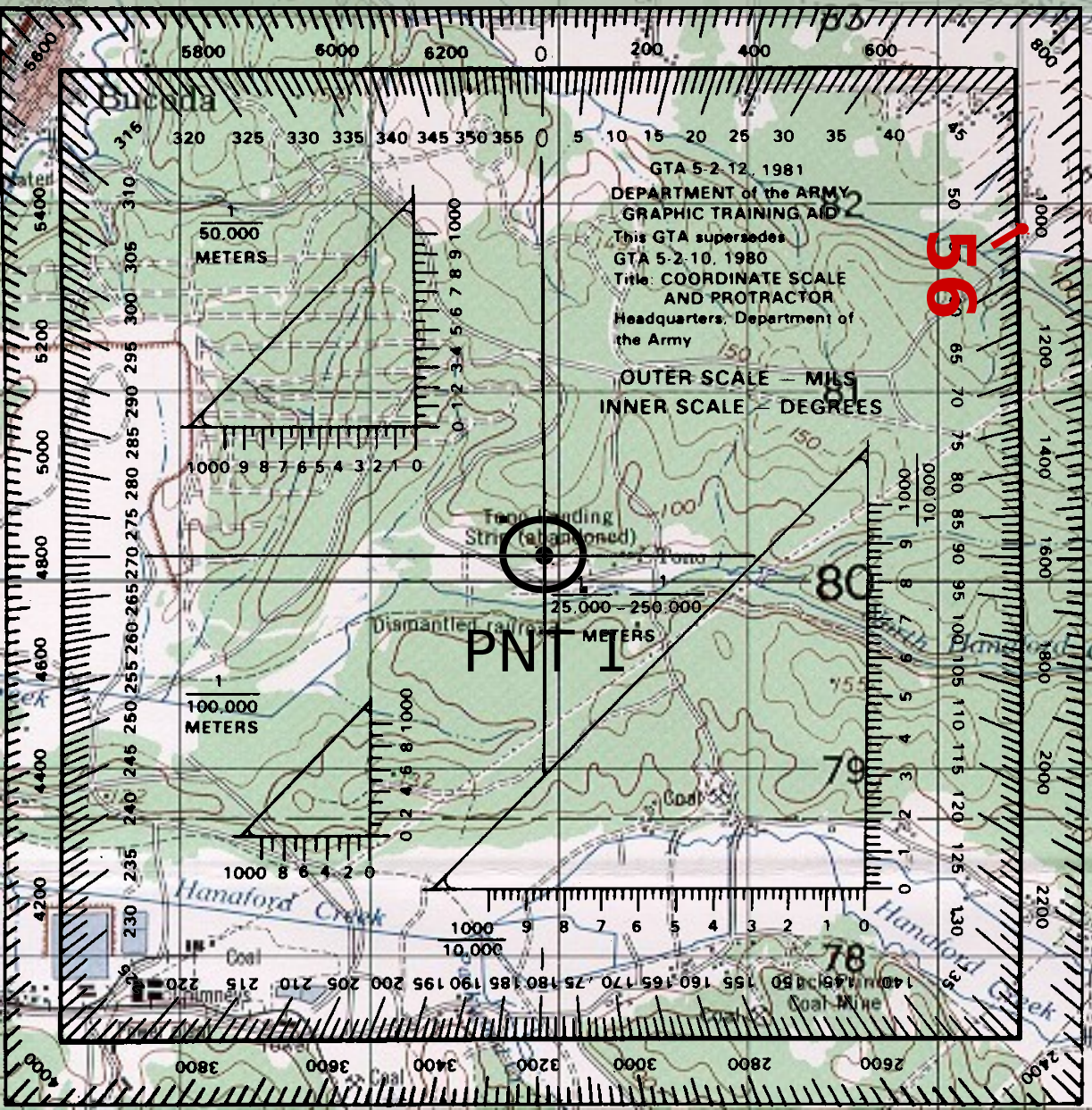
STEP 1. PLACE THE INDEX MARK OF THE PROTRACTOR AT THE CENTER OF MASS ON THE POINT FROM WHICH YOU ARE MEASURING.

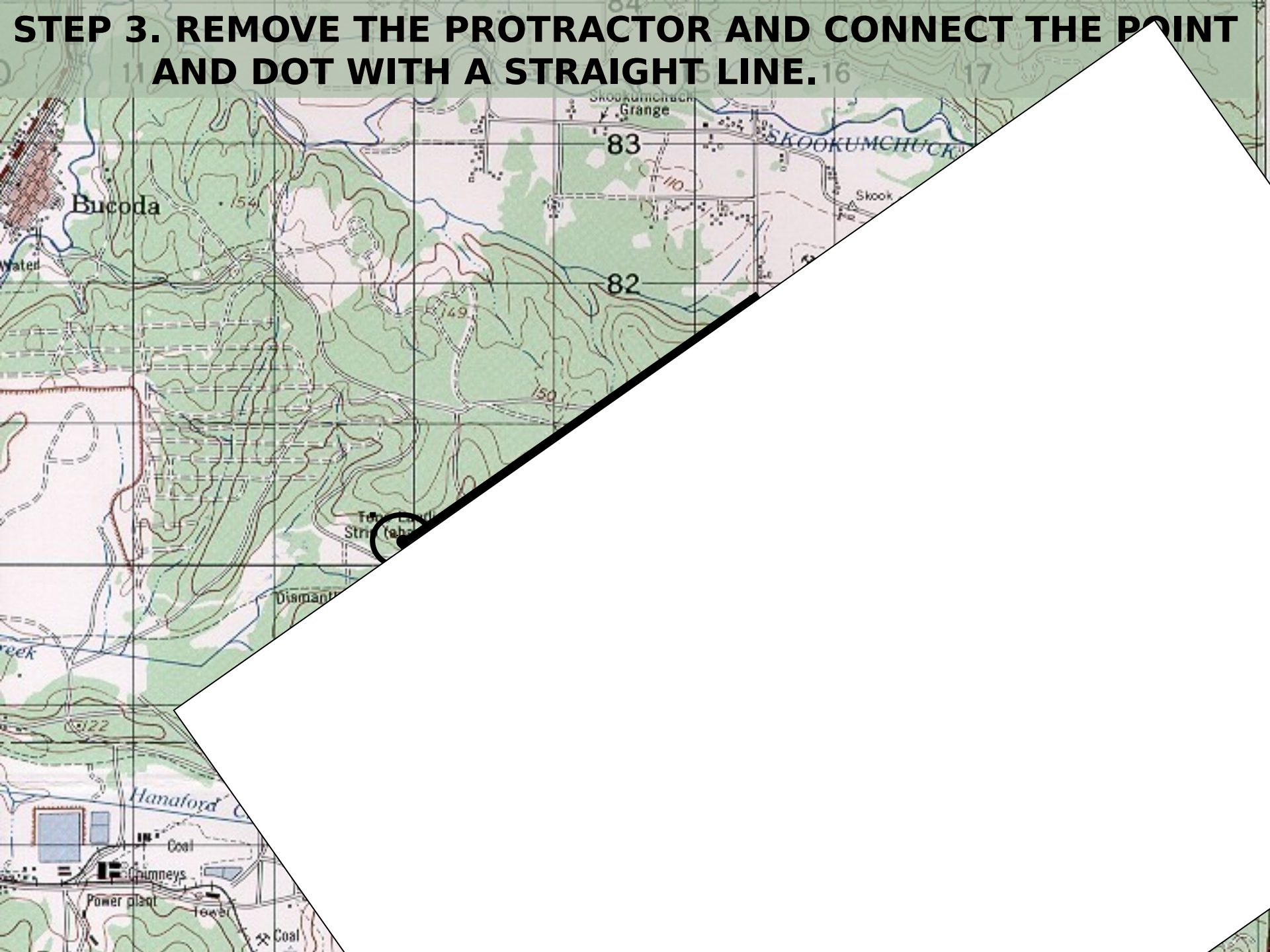


STEP 2. LOCATE THE DESIRED AZIMUTH ON THE PROTRACTOR SCALE AND PLACE A DOT ON THE MAP AT THIS AZIMUTH.

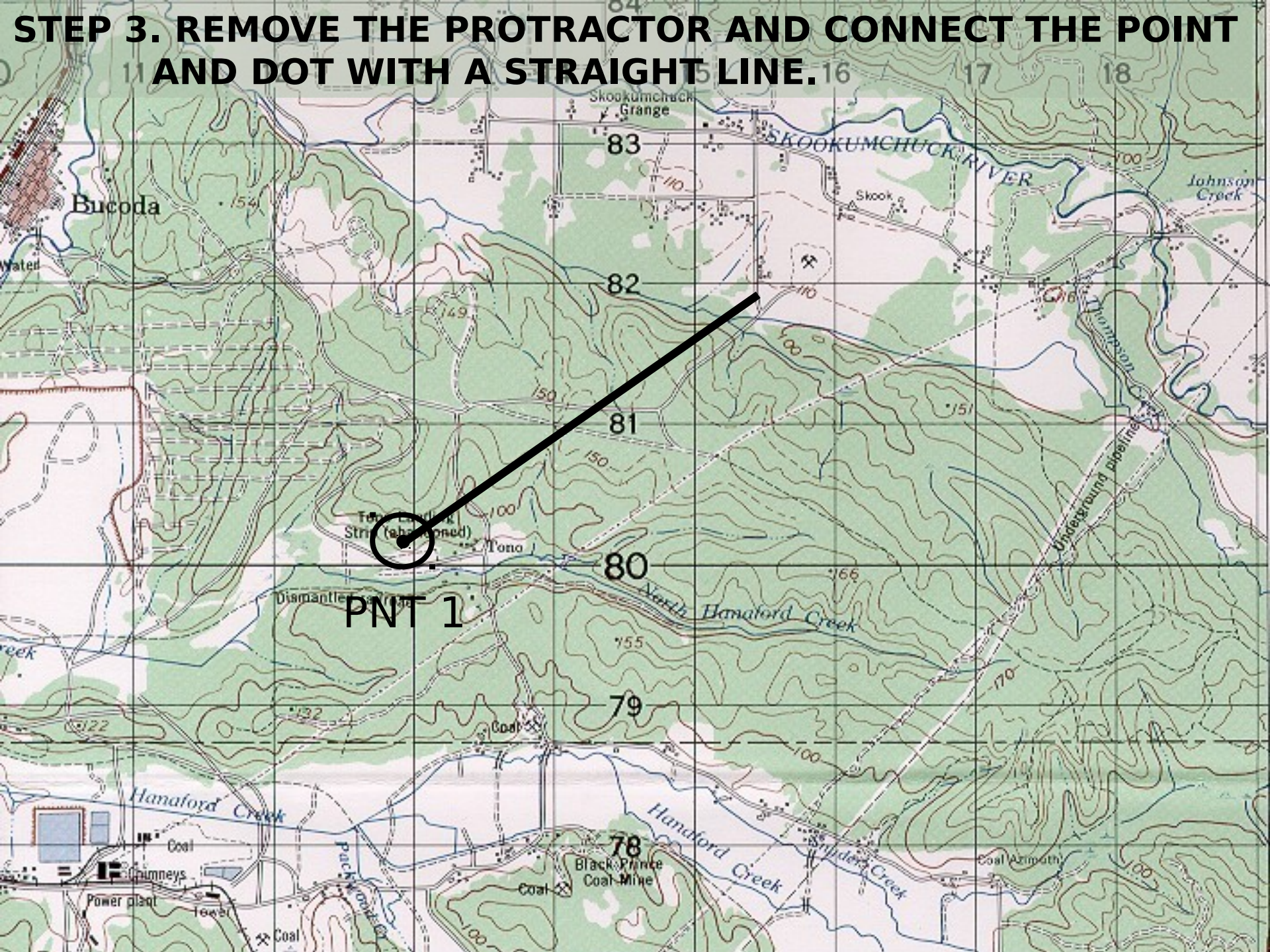


EXAMPLE: 56 DEGREES

STEP 3. REMOVE THE PROTRACTOR AND CONNECT THE POINT AND DOT WITH A STRAIGHT LINE.

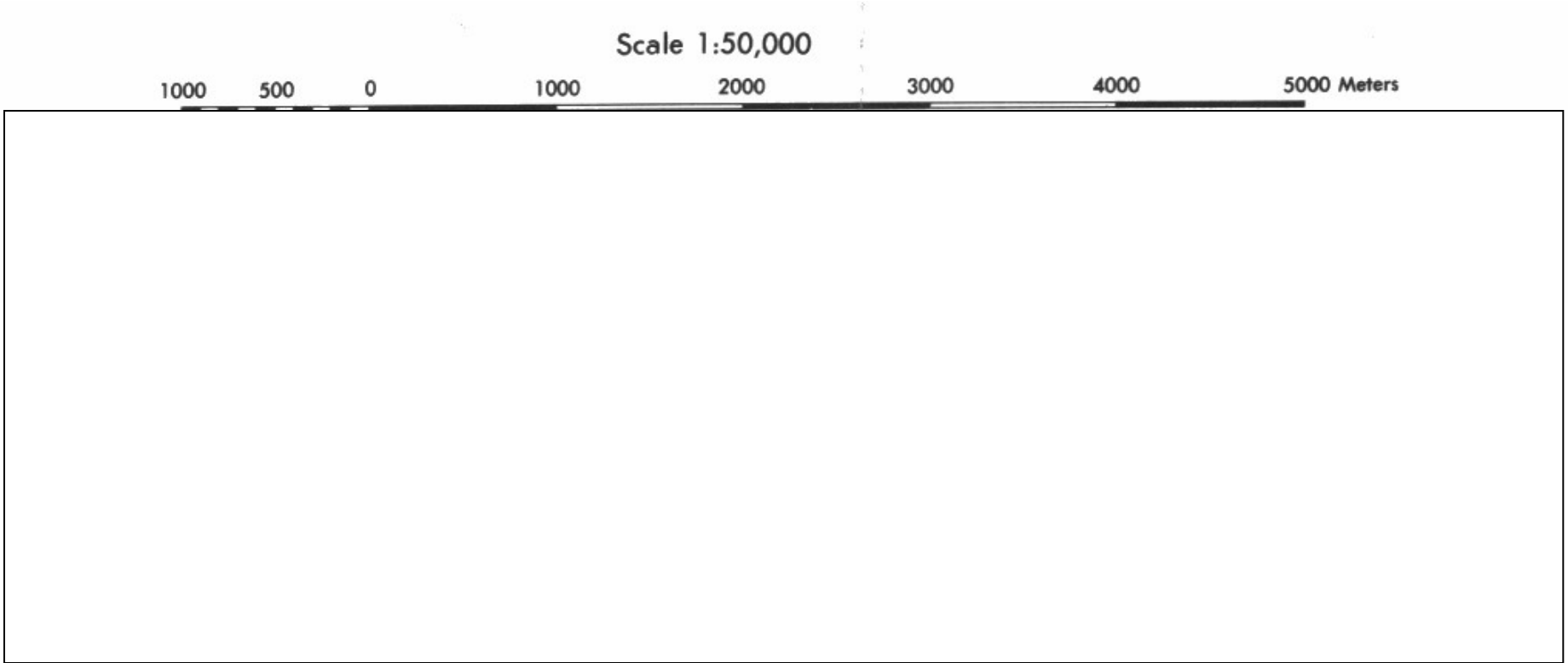


STEP 3. REMOVE THE PROTRACTOR AND CONNECT THE POINT AND DOT WITH A STRAIGHT LINE.



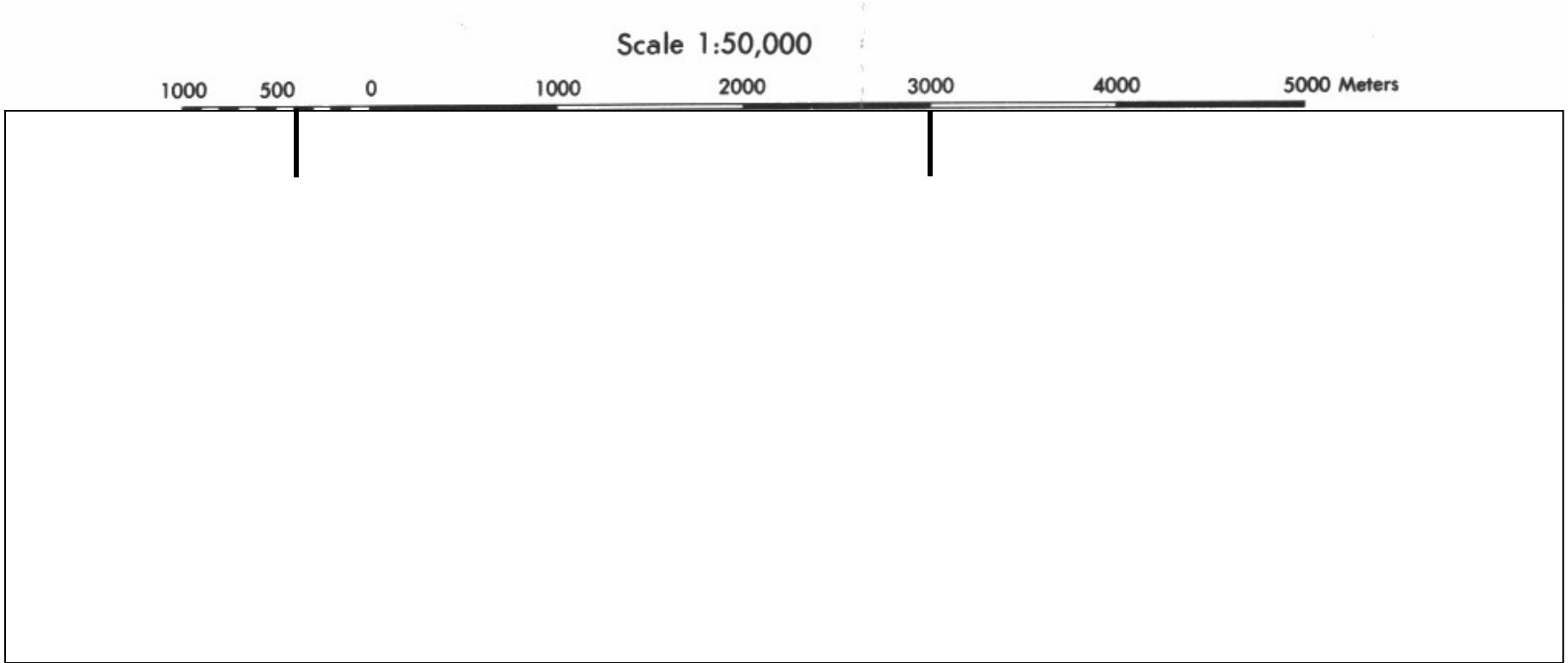
STEP 1. SELECT THE APPROPRIATE SCALE MEASUREMENT AN
PLACE A PAPER STRAIGHT EDGE ON THE SCALE.

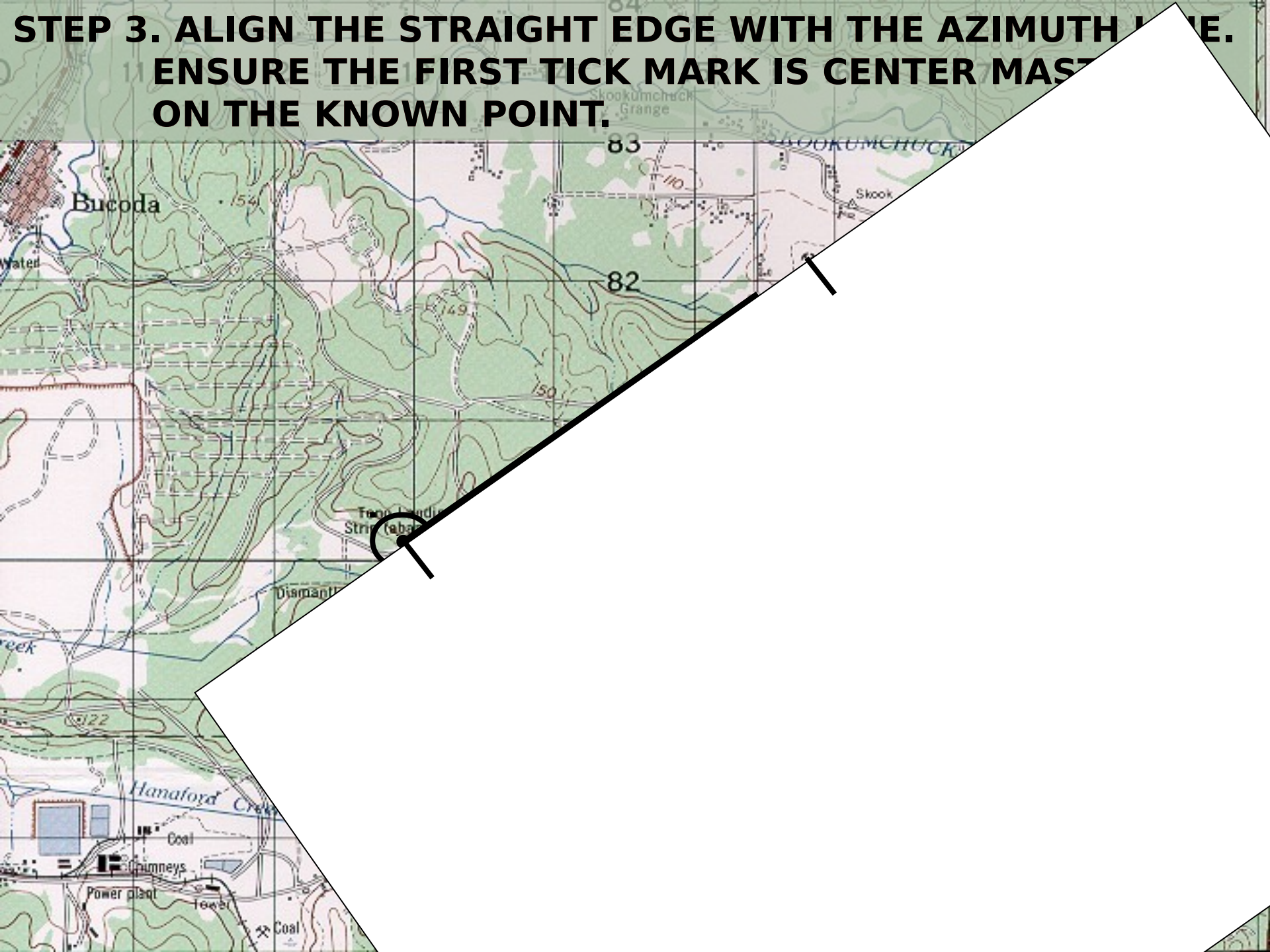
EXAMPLE: DISTANCE IN METERS



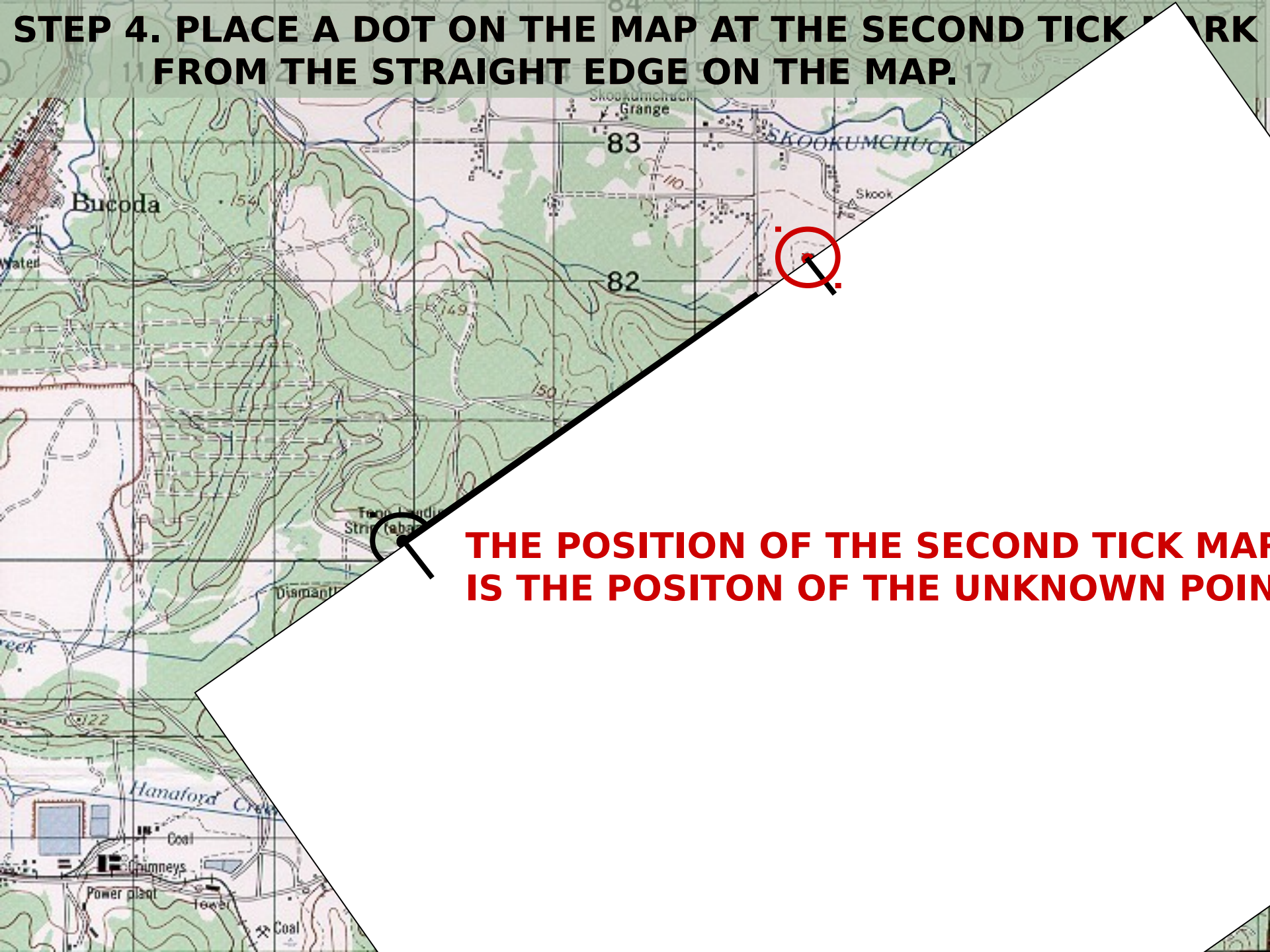
STEP 2. DETERMINE THE DESIRED DISTANCE TO MEASURE FR
THE SCALE AND MARK THE PAPER AT THIS DISTANCE
USING TICK MARKS.

EXAMPLE: 3400 METERS

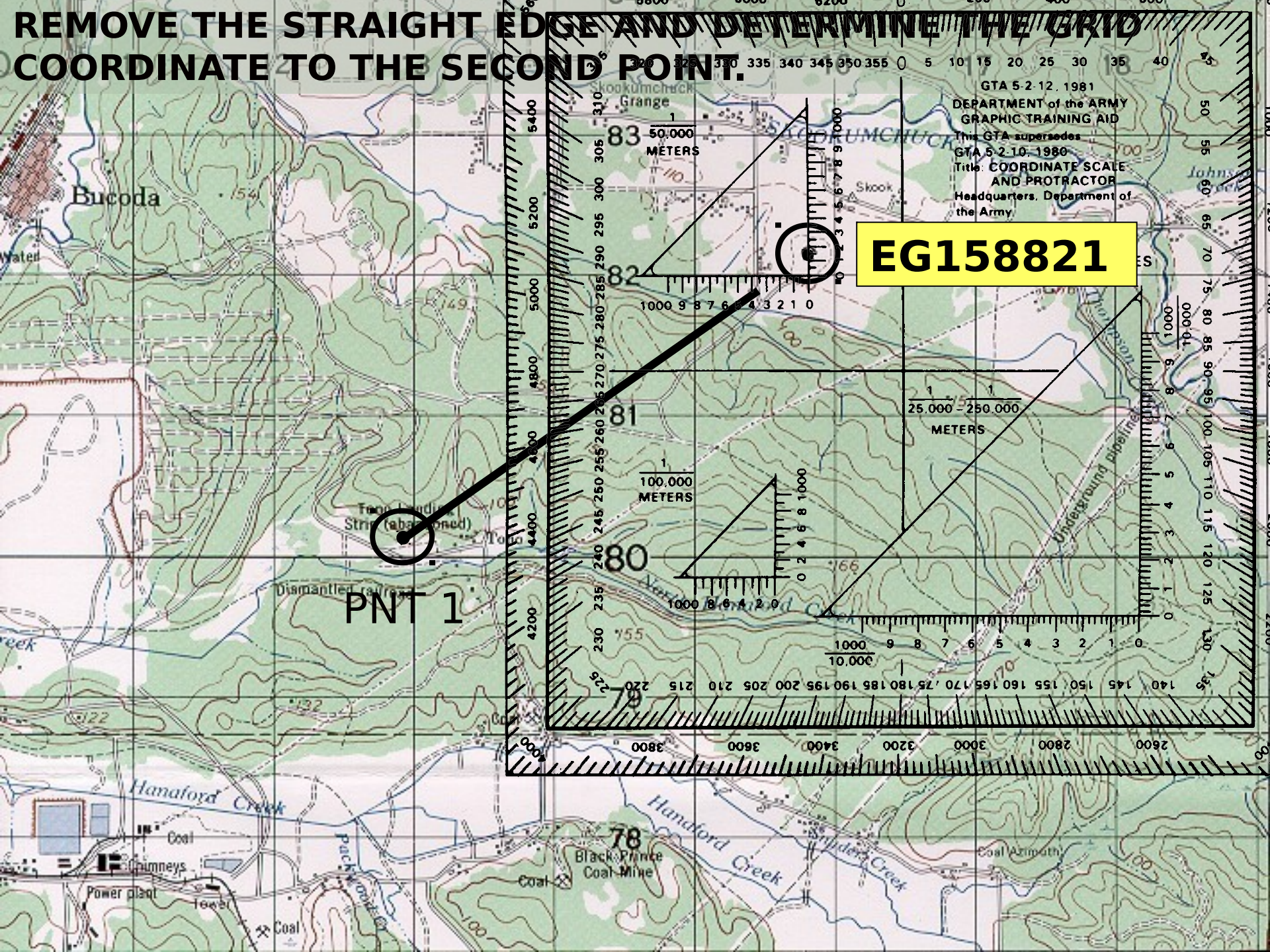



STEP 3. ALIGN THE STRAIGHT EDGE WITH THE AZIMUTH LINE.
ENSURE THE FIRST TICK MARK IS CENTER MAST
ON THE KNOWN POINT.
Bucoda
83
82
Skookumchuck
Grange
Skook
Hamaford Creek
Coal
Chimneys
Power plant
Tower
Coal

STEP 4. PLACE A DOT ON THE MAP AT THE SECOND TICK MARK FROM THE STRAIGHT EDGE ON THE MAP.



THE POSITION OF THE SECOND TICK MAR
IS THE POSITON OF THE UNKNOWN POIN


REMOVE THE STRAIGHT EDGE AND DETERMINE THE GRID COORDINATE TO THE SECOND POINT.
GTA 5-2-12, 1981
DEPARTMENT of the ARMY
GRAPHIC TRAINING AID
This GTA supersedes
GTA 5-2-10, 1980
Title: COORDINATE SCALE AND PROTRACTOR
Headquarters, Department of the Army
EG158821
PNT 1
Bucoda
Skookumchuck
Grange
Hanaford Creek
Black Prince Coal Mine
Power plant
Chimneys
Coal
Underground pipeline
1 / 50,000 METERS
1 / 25,000 – 1 / 250,000 METERS
1 / 100,000 METERS
1000 / 10,000

PRACTICAL EXERCISES

QUESTION: What are the polar coordinates plotted from the horizontal control station “Skook” in grid square EG1682 at an azimuth of 272 degrees and a distance of 3100 meters?

ANSWER: EG130826

QUESTION: What are the polar coordinates plotted from the water tower in grid square EG1185 at an azimuth of 46 degrees and a distance of 2000 meters?

ANSWER: EG12958695

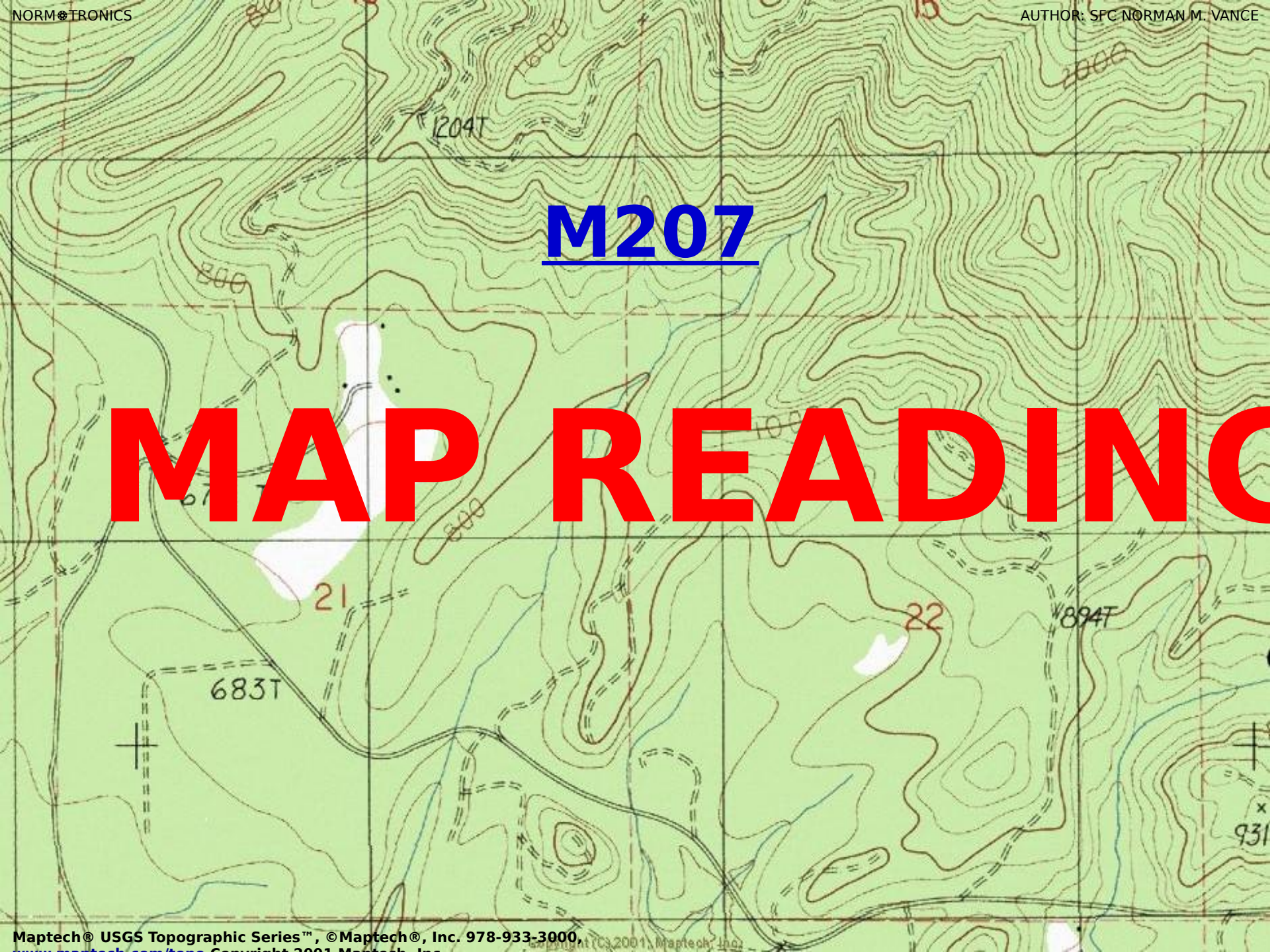
QUESTION: What are the polar coordinates plotted from the water tower in grid square EG1185 at an azimuth of 81 degrees and a distance of 3150 meters?

ANSWER: EG14658605

AUTHOR: SFC NORMAN M. VANCE

M207

MAP READING



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ENABLING LEARNING OBJECTIVE #9

ACTION: LOCATE AN UNKOWN POINT ON A MAP BY INTERSECTION.

CONDITIONS: IN A CLASSROOM ENVIRONMENT GIVEN A STANDARD 1:50,000 SCALE MILITARY MAP OF 'TENINO', THE LOCATION OF TWO KNOWN POINTS, A STRAIGHT EDGE, AND A PROTRACTOR (GTA 5-2-12), A PENCIL, AND AN OBJECT OR TERRAIN FEATURE FOR WHICH TO DETERMINE THE GRID LOCATION.

STANDARDS: DETERMINE THE 100,000 METER SQUARE IDENTIFICATION LETTERS AND SIX-DIGIT COORDINATES OF THE OBJECT OR TERRAIN FEATURE TO WITHIN 100 METERS.

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INTERSECTION

- DETERMINE THE POSITION OF AN UNKNOWN POINT BY OCCUPYING AT LEAST TWO, BUT PREFERABLY THREE, KNOWN POSITIONS.
- DETERMINE THE AZIMUTH TO THE UNKNOWN POINT FROM THESE POSITONS.
- PLOT THE AZIMUTHS FROM THE POSITONS TO LOCATE THE UNKNOWN POINT BY THEIR INTERSECTION.

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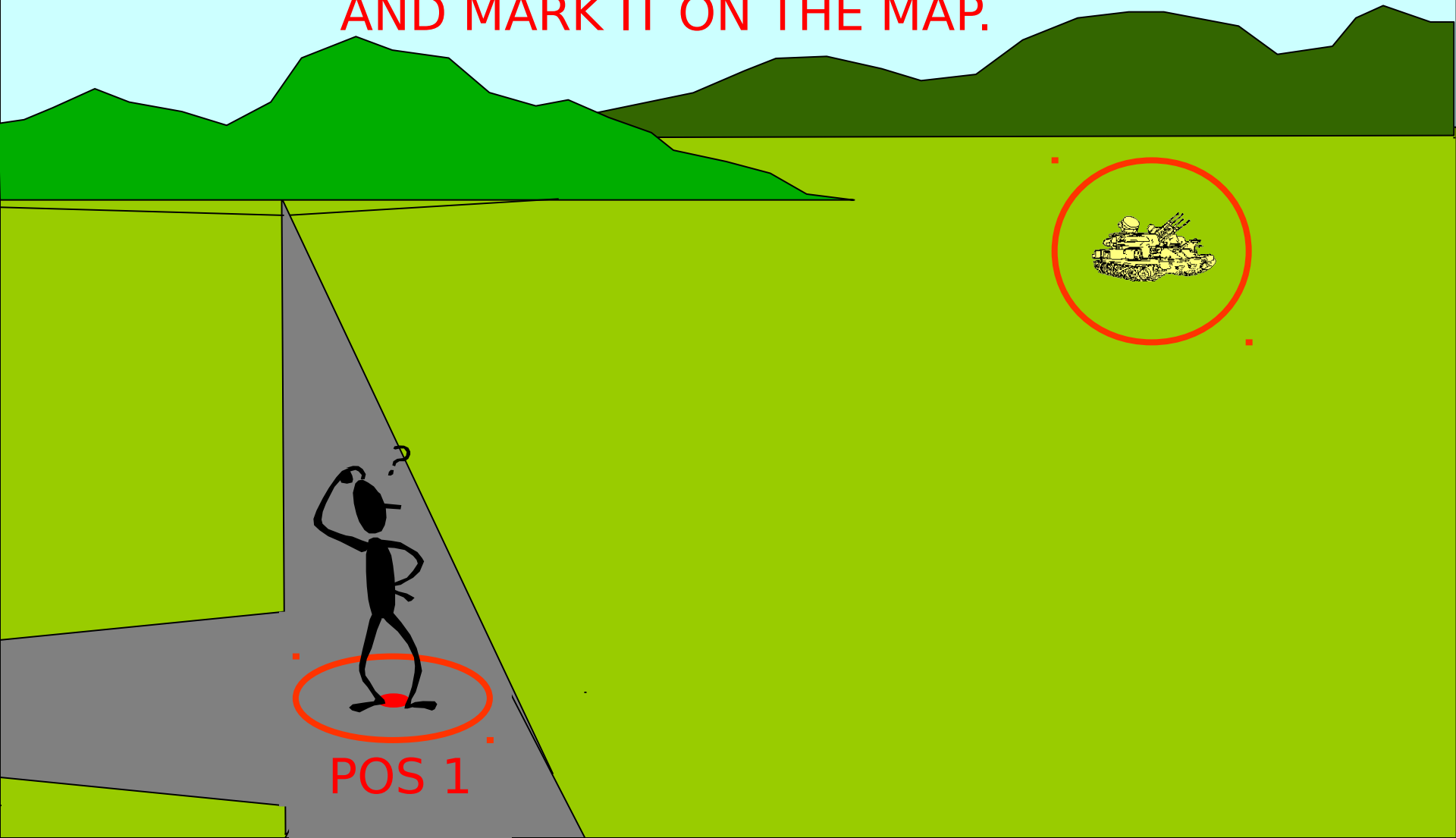
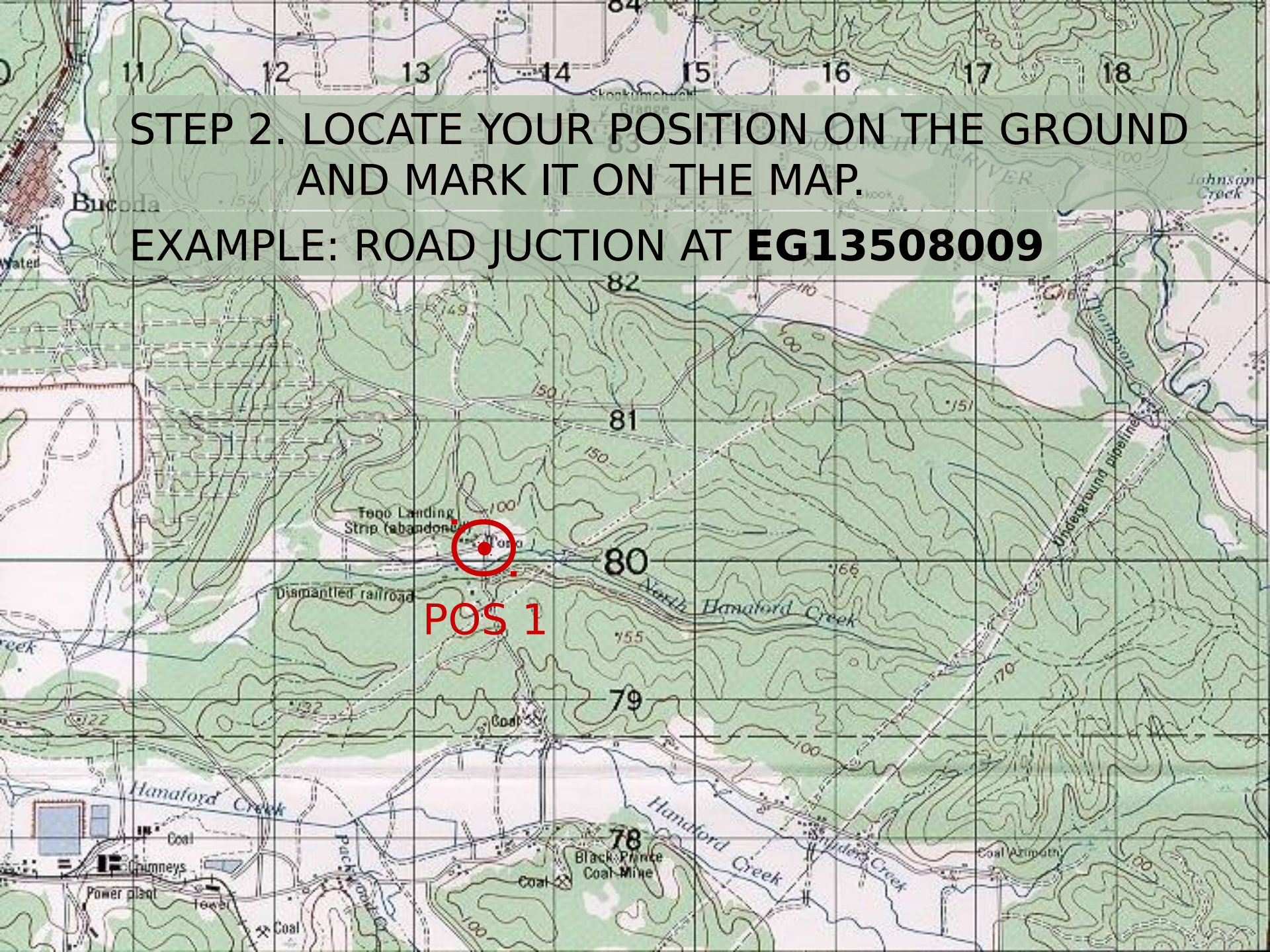
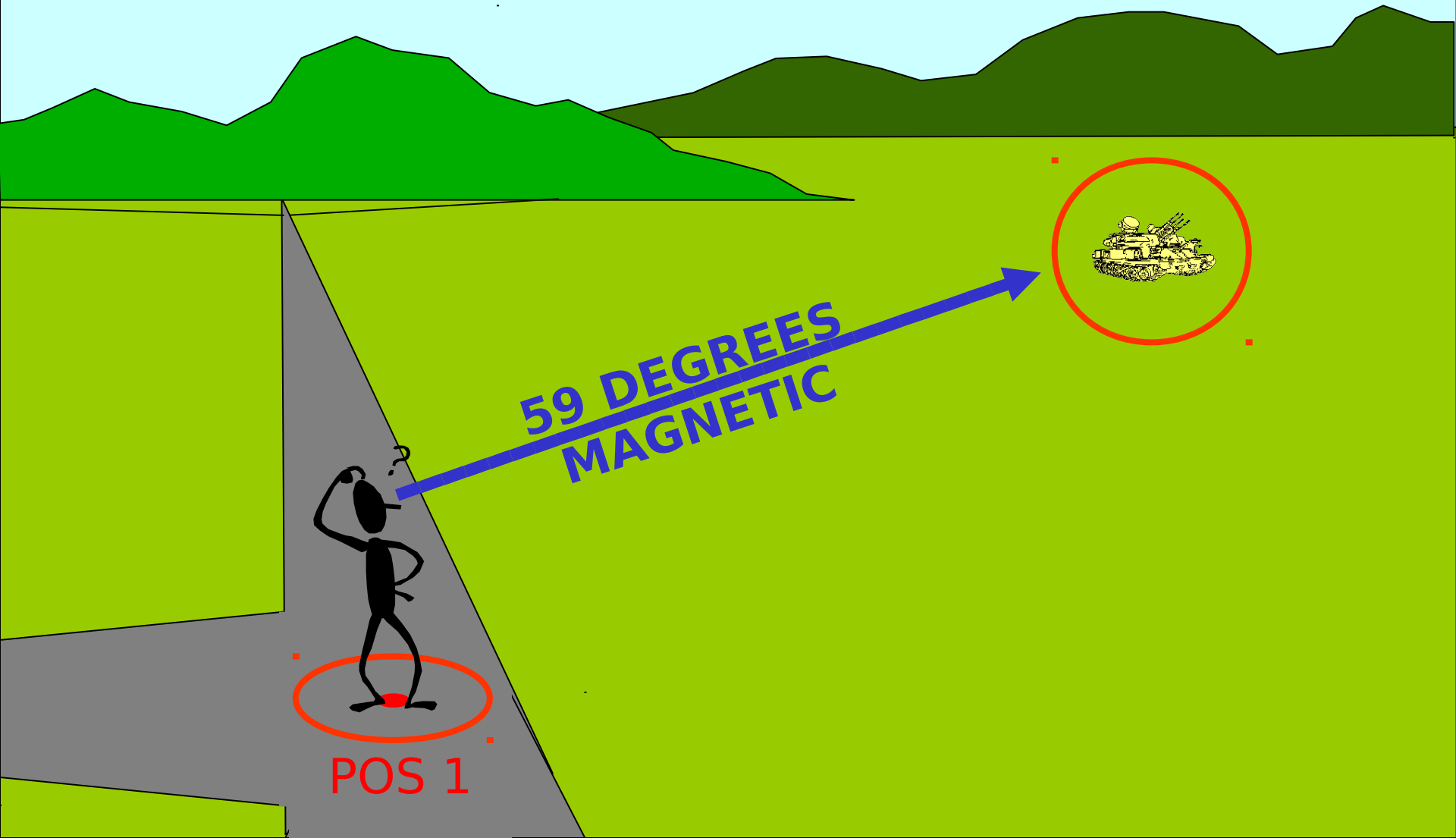
STEP 1. SIGHT THE UNKNOWN POINT ON THE GROUND.

STEP 2. LOCATE YOUR POSITION ON THE GROUND AND MARK IT ON THE MAP.




STEP 2. LOCATE YOUR POSITION ON THE GROUND AND MARK IT ON THE MAP.
EXAMPLE: ROAD JUCTION AT **EG13508009**
POS 1
11
12
13
14
15
16
17
18
82
81
80
79
78
Bucoda
Johnson Creek
Undergrround pipeline
Dismantled railroad
North Hanaford Creek
Hanaford Creek
Coal
Chimneys
Power plant
Tower
Black Prince Coal Mine
Coal Azimuth

STEP 3. DETERMINE THE MAGNETIC AZIMUTH FROM THE ROAD JUNCTION TO THE ENEMY POSITION.



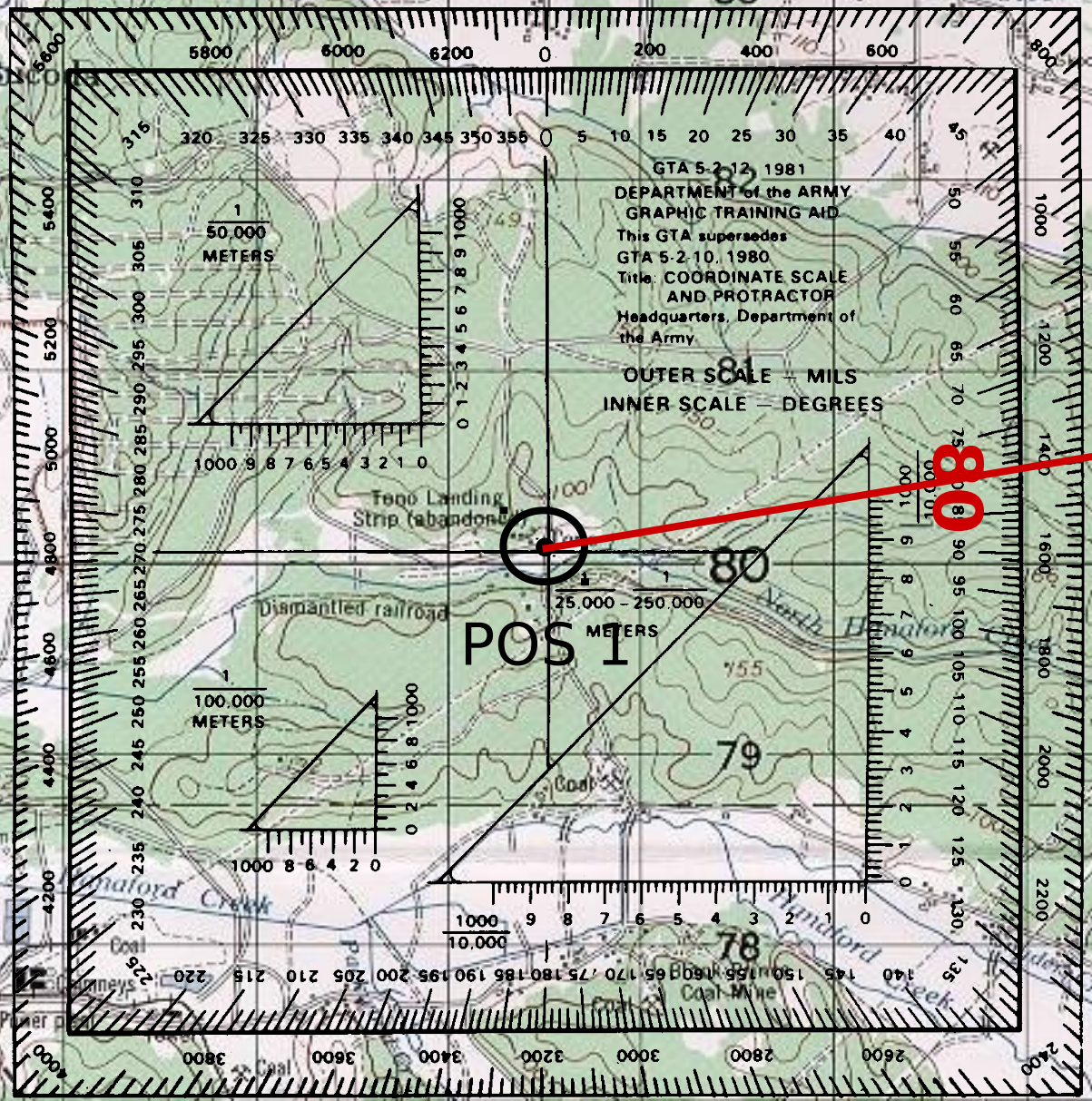
STEP 4. CONVERT THE MAGNETIC AZIMUTH TO A GRID AZIMUTH.

MAGNETIC AZIMUTH: 59 DEGREES

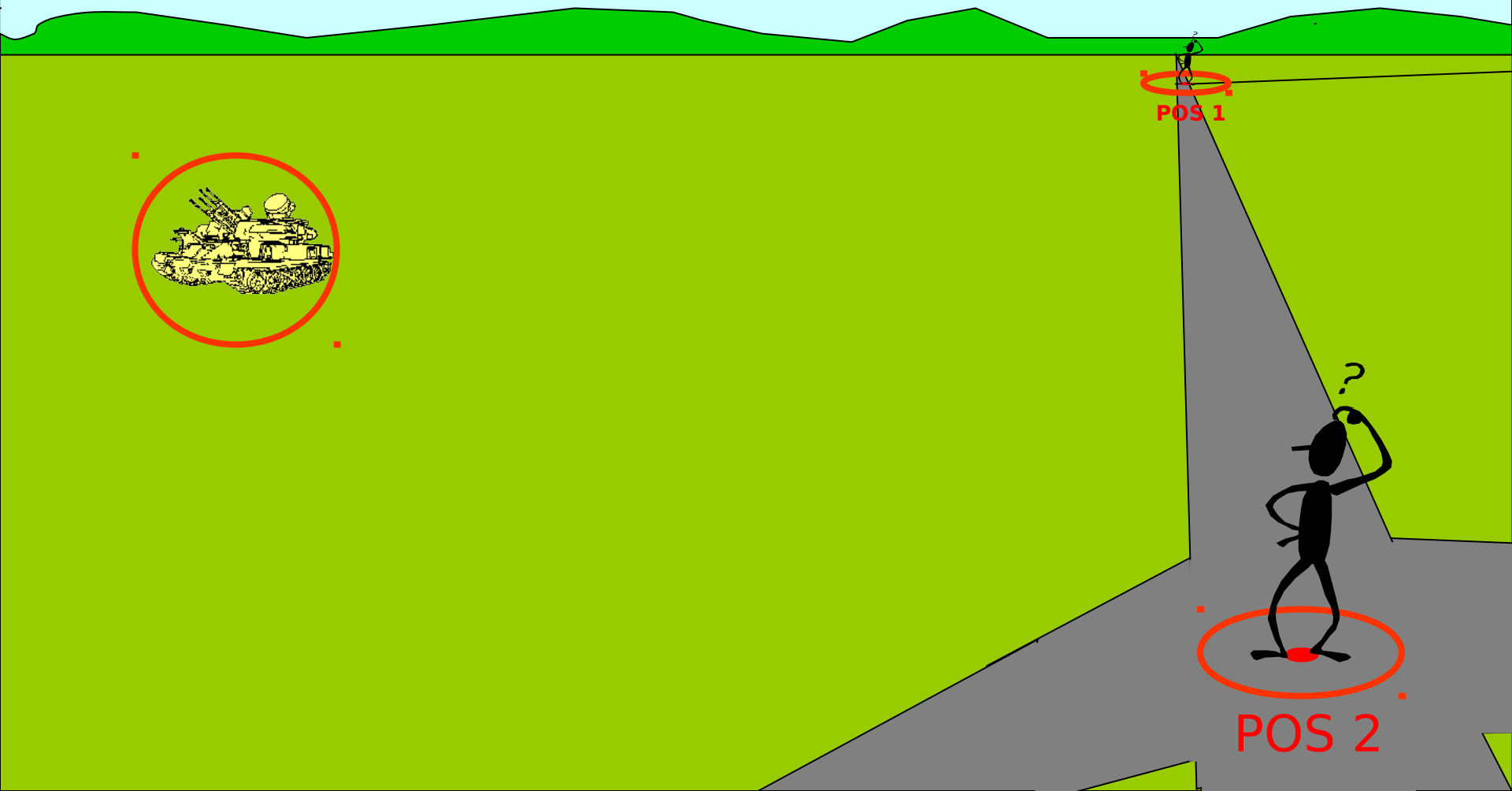
EASTERLY G-M ANGLE: +21 DEGREES

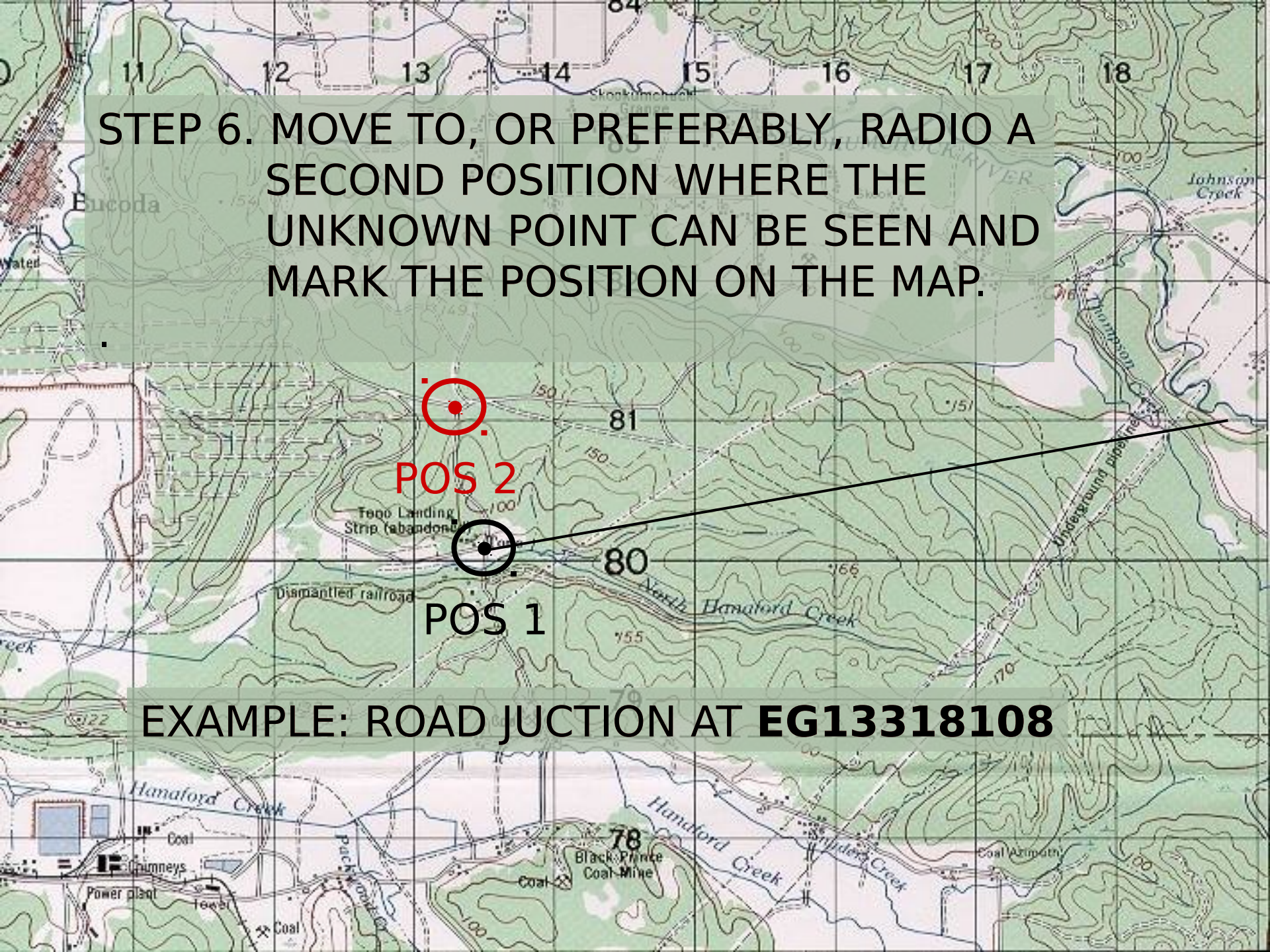
GRID AZIMUTH: 80 DEGREES

STEP 5. DRAW A LINE FROM THE ROAD JUNCTION ALONG THE 80 DEGREE GRID AZIMUTH.

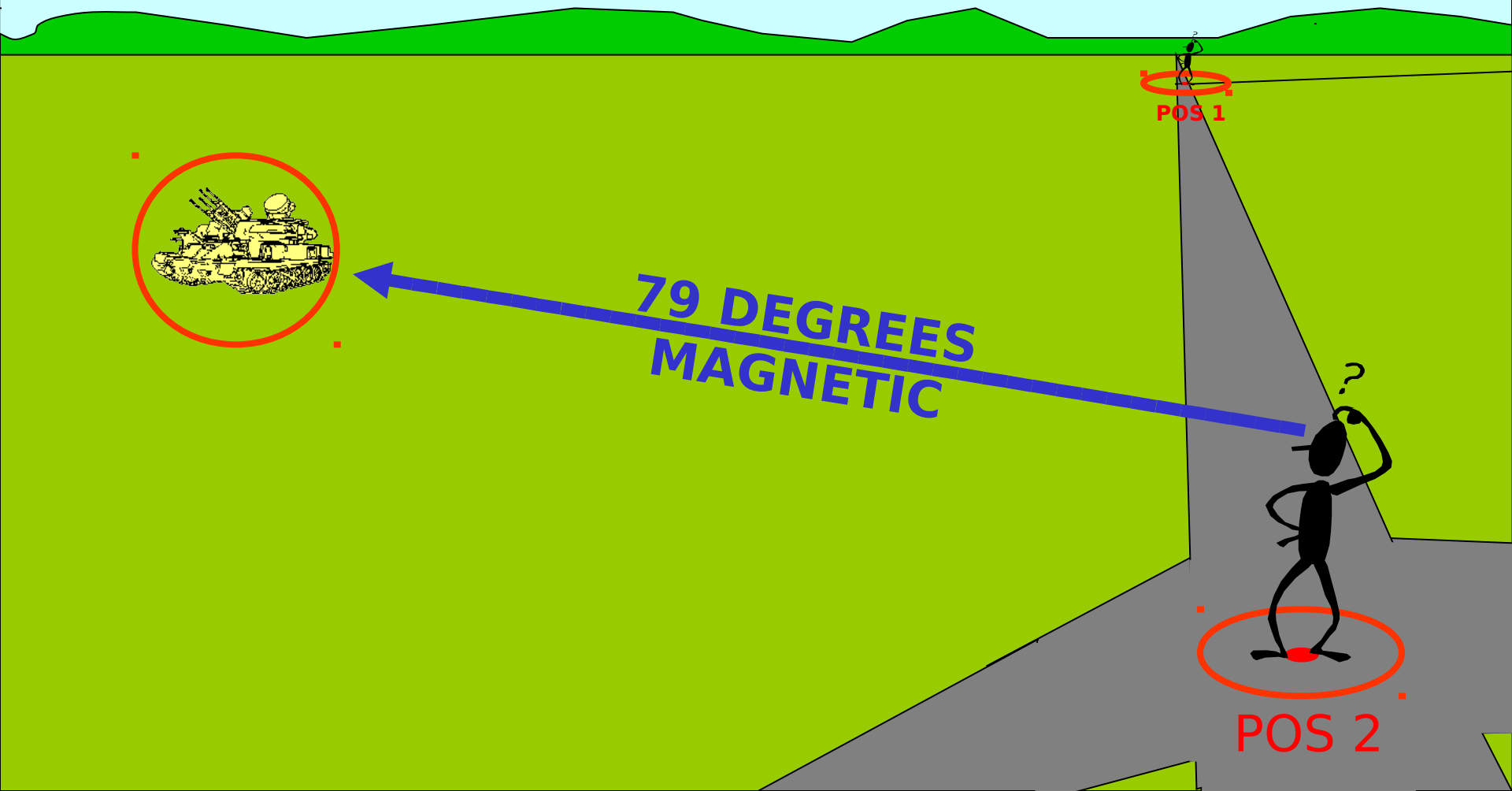


STEP 6. MOVE TO, OR PREFERABLY, RADIO A SECOND POSITION WHERE THE UNKNOWN POINT CAN BE SEEN AND MARK THE POSITION ON THE MAP.




STEP 6. MOVE TO, OR PREFERABLY, RADIO A SECOND POSITION WHERE THE UNKNOWN POINT CAN BE SEEN AND MARK THE POSITION ON THE MAP.
.
POS 2
POS 1
EXAMPLE: ROAD JUCTION AT **EG13318108**

STEP 7. DETERMINE THE MAGNETIC AZIMUTH FROM THE SECOND ROAD JUNCTION TO THE ENEMY POSITION.

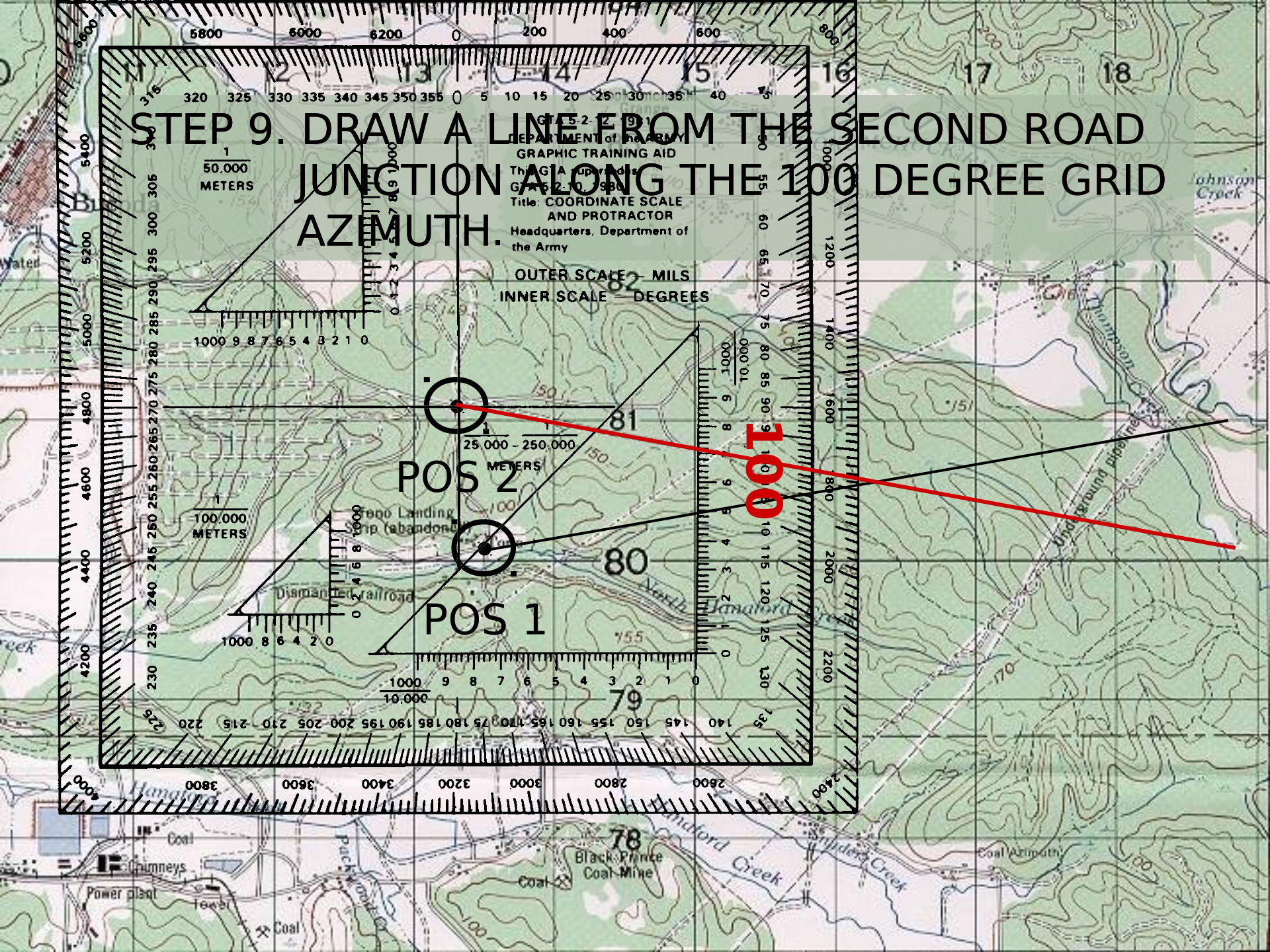


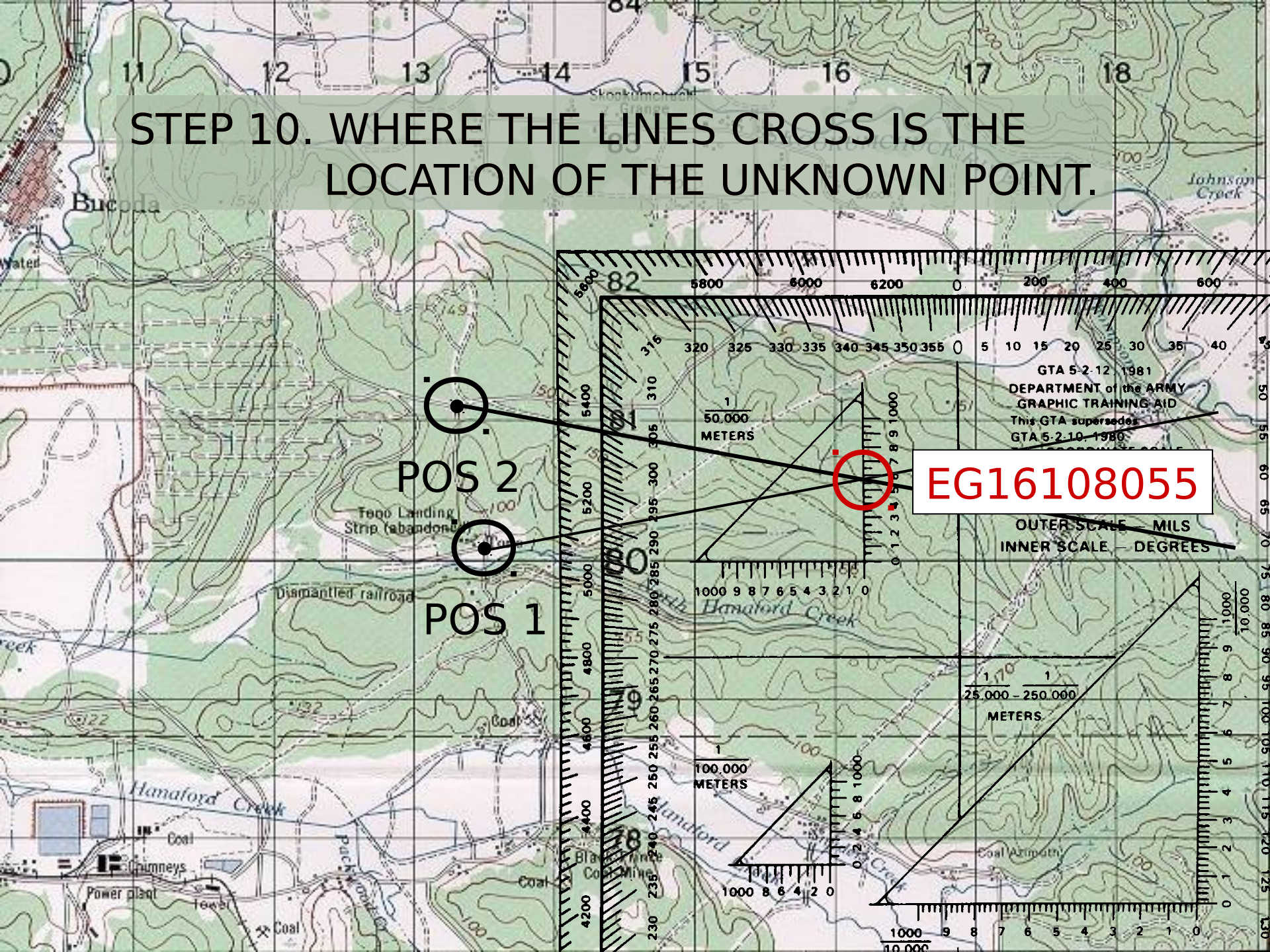
STEP 4. CONVERT THE MAGNETIC AZIMUTH TO A GRID AZIMUTH.

MAGNETIC AZIMUTH: 79 DEGREES

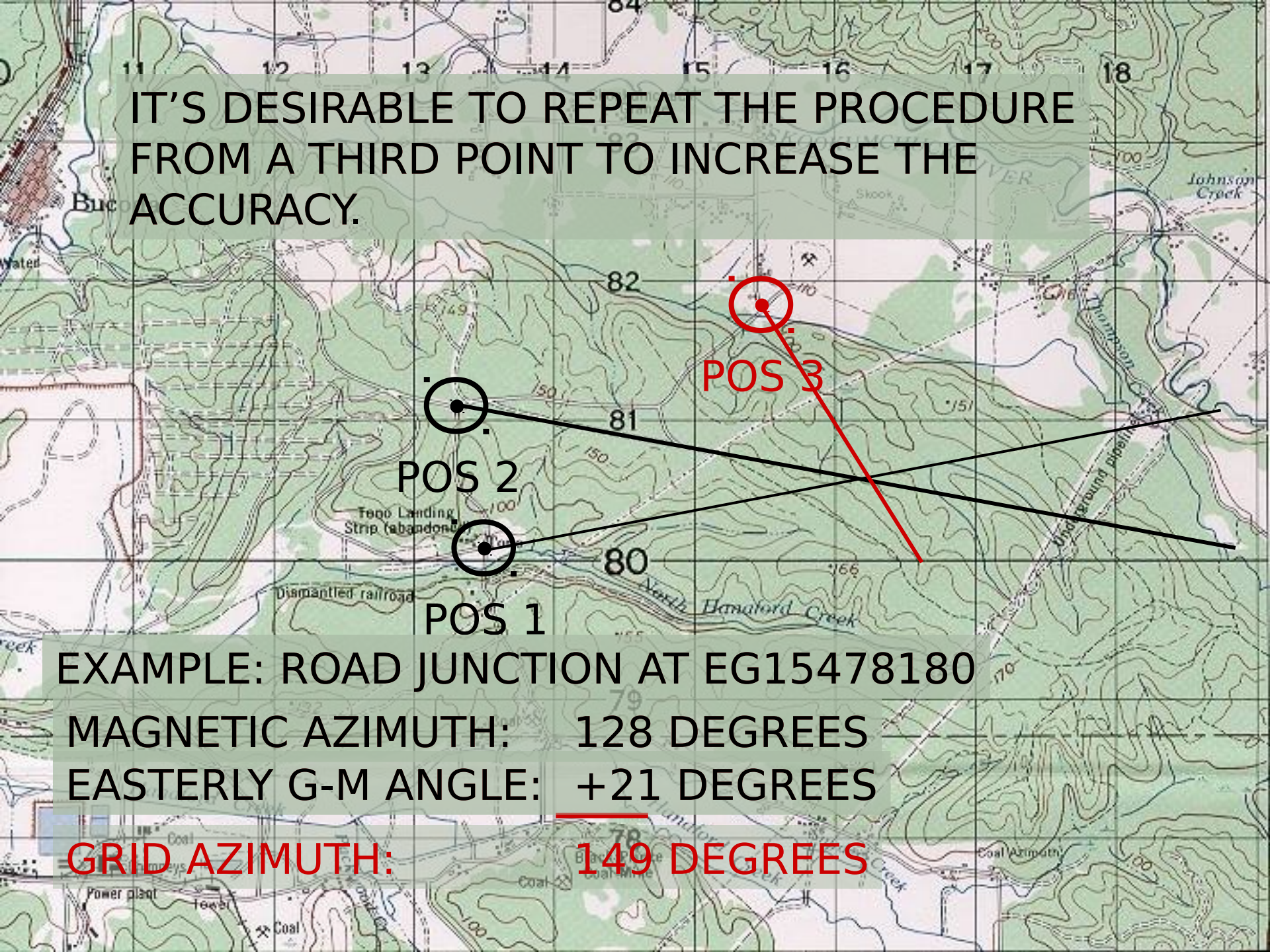
EASTERLY G-M ANGLE: +21 DEGREES

GRID AZIMUTH: 100 DEGREES


STEP 9. DRAW A LINE FROM THE SECOND ROAD JUNCTION ALONG THE 100 DEGREE GRID AZIMUTH.
GTA 5-2-12 (1)
DEPARTMENT of the ARMY
GRAPHIC TRAINING AID
This GTA supersedes
GTA 5-2-10, 15 Dec 50
Title: COORDINATE SCALE AND PROTRACTOR
Headquarters, Department of the Army
OUTER SCALE — MILS
INNER SCALE — DEGREES
1 / 50,000 METERS
1 / 25,000 – 250,000 METERS
1 / 100,000 METERS
1000 / 10,000
POS 2
POS 1
100
Coal
Chimneys
Power plant
Tower
Coal
Black Prince Coal Mine
Coal
Coal Azimuth
Johnson Creek
Underground pipeline
Diamond Creek Railroad
Troop Landing Strip (abandoned)
North Hanaford Creek
Hanaford Creek
Snyders Creek
78
79
80
81
82


STEP 10. WHERE THE LINES CROSS IS THE LOCATION OF THE UNKNOWN POINT.
POS 2
POS 1
EG16108055
GTA 5-2-12, 1981
DEPARTMENT of the ARMY
GRAPHIC TRAINING AID
This GTA supersedes
GTA 5-2-10, 1980
OUTER SCALE — MILS
INNER SCALE — DEGREES
1/50,000 METERS
1/25,000 – 1/250,000 METERS
1/100,000 METERS
Hamaford Creek
Dismantled railroad
Coal
Chimneys
Power plant
Tower
Johnson Creek

IT'S DESIRABLE TO REPEAT THE PROCEDURE FROM A THIRD POINT TO INCREASE THE ACCURACY.

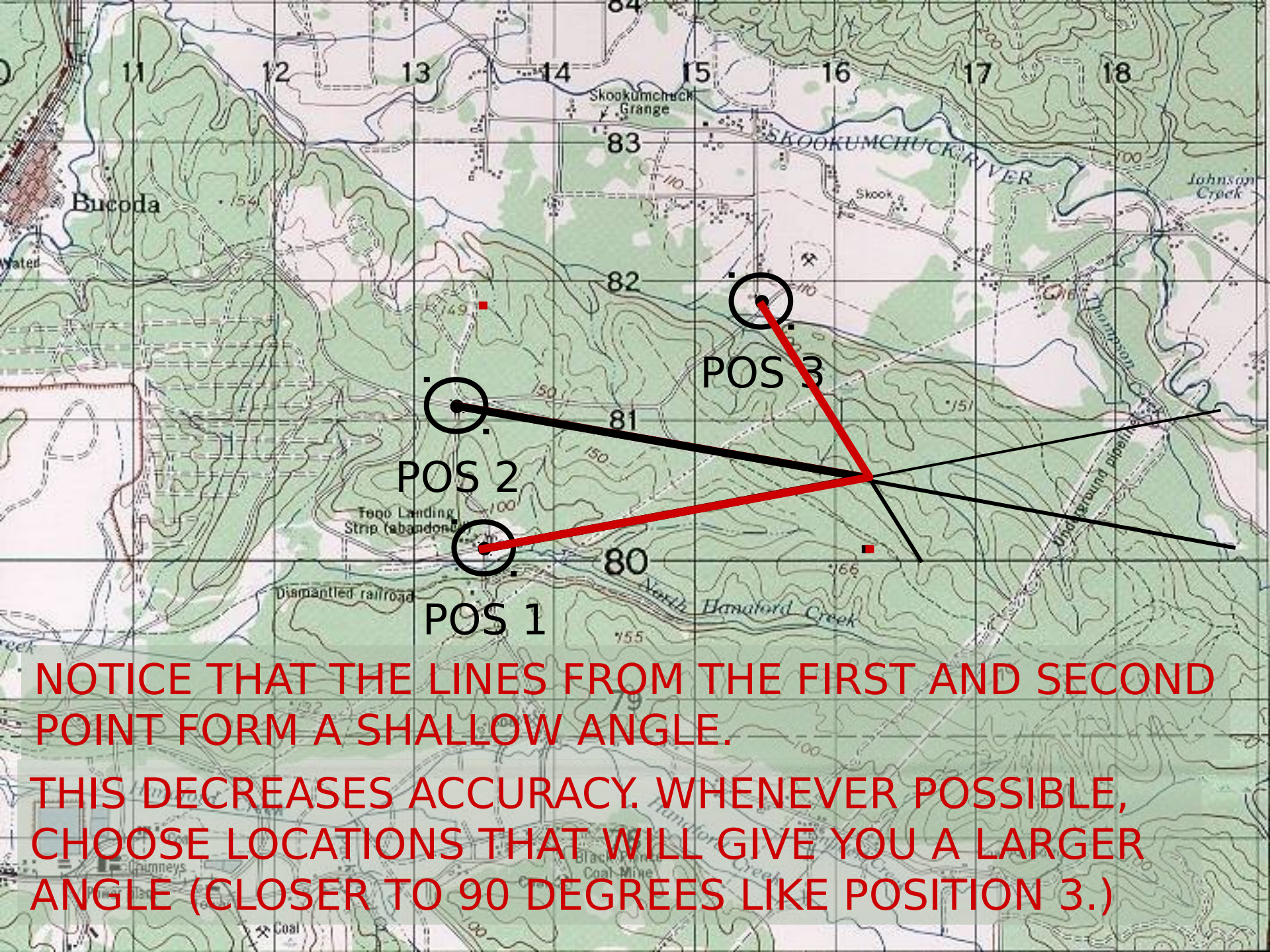


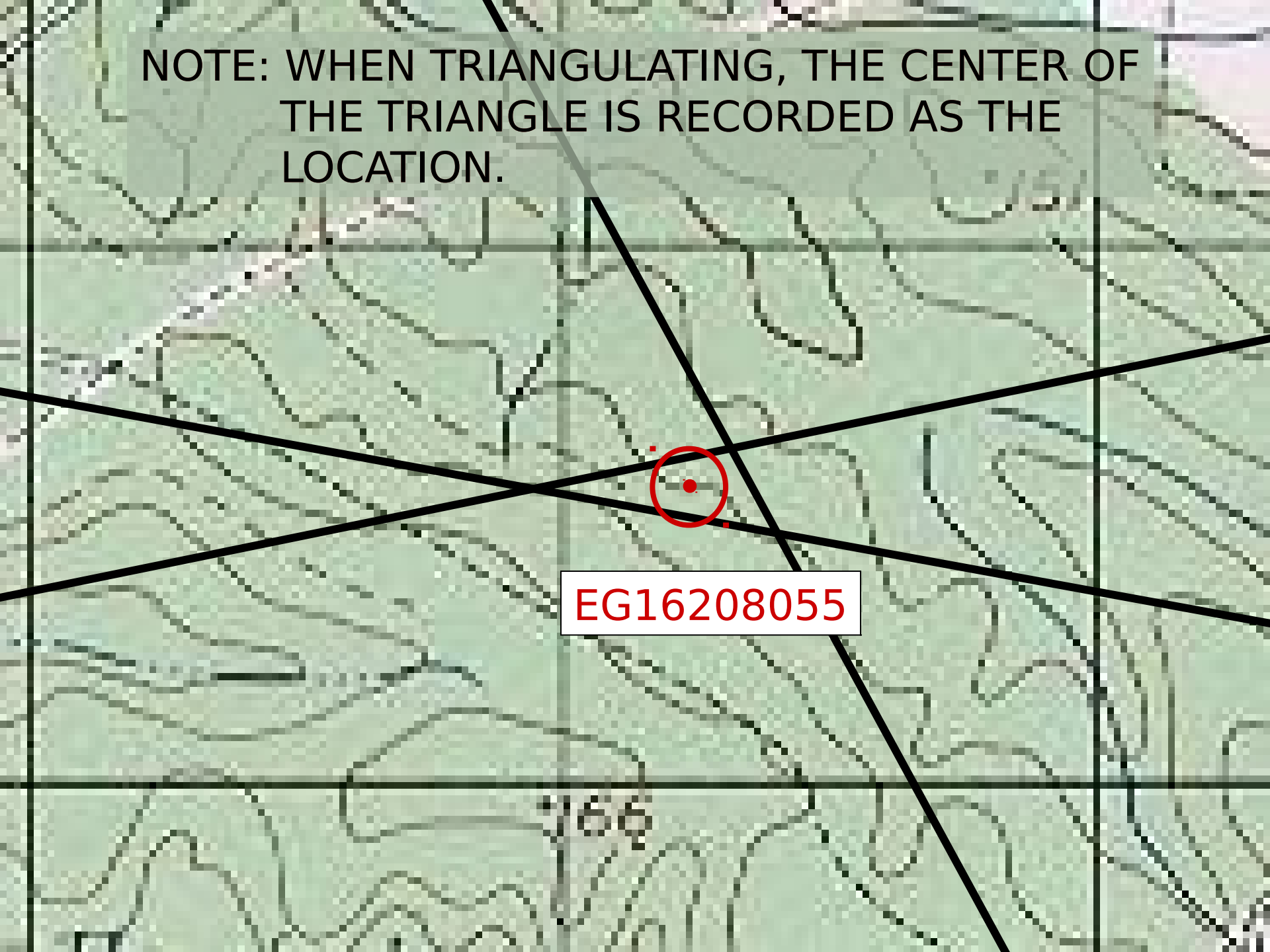
EXAMPLE: ROAD JUNCTION AT EG15478180

MAGNETIC AZIMUTH: 128 DEGREES

EASTERLY G-M ANGLE: +21 DEGREES

GRID AZIMUTH: 149 DEGREES


POS 3
POS 2
POS 1
NOTICE THAT THE LINES FROM THE FIRST AND SECOND POINT FORM A SHALLOW ANGLE.
THIS DECREASES ACCURACY. WHENEVER POSSIBLE, CHOOSE LOCATIONS THAT WILL GIVE YOU A LARGER ANGLE (CLOSER TO 90 DEGREES LIKE POSITION 3.)


NOTE: WHEN TRIANGULATING, THE CENTER OF THE TRIANGLE IS RECORDED AS THE LOCATION.
EG16208055
166

PRACTICAL EXCERCISE

YOUR SQUAD OCCUPIES TWO OBSERVATION POSTS. THE TEAM AT THE WATER TOWER IN GRID SQUARE EG0985 SEES THE ENEMY AT A MAGNETIC AZIMUTH OF 351 DEGREES. THE SECOND TEAM, LOCATED AT THE WATER TOWER IN GRID SQUARE EG1185 SEES THE ENEMY AT A MAGNETIC AZIMUTH OF 300 DEGREES.

QUESTION: WHAT IS THE GRID LOCATION OF THE ENEMY?

ANSWER: GRID COORDINATE EG09798765

PRACTICAL EXERCISE #2

YOUR SQUAD IS OPERATING AS AN OBSERVATION TEAM AND YOU SEE SIX ENEMY HELICOPTERS LAND AND THEN DISAPPEAR FROM YOUR SIGHT. PRIOR TO THE HELICOPTERS DISAPPEARING, YOU SHOT A MAGNETIC AZIMUTH TO THE LOCATION WHERE YOU SAW THEM LAND. THIS MAGNETIC AZIMUTH IS 316 1/2 DEGREES. YOUR LOCATION IS THE BRIDGE IN GRID SQUARE EH1000. YOU CONTACT YOUR OTHER TEAM LOCATED IN THE ZION CHAPEL TOWER AT GRID SQUARE EH1102. THEY HAVE A SIGHTING OF SIX ENEMY HELICOPTERS AT A MAGNETIC AZIMUTH OF 229 1/2 DEGREES. BOTH YOUR TEAMS PERFORM AN INTERSECTON.

QUESTION: WHAT IS THE GRID LOCATION AND THE TYPE OF TERRAIN WHERE THE SIX ENEMY HELICOPTERS LANDED?

ANSWER: GRID LOCATION EH093022, DEPRESSION.

INTERSECTION WITHOUT A COMPASS

STEP 1. ORIENT THE MAP TO THE GROUND.

STEP 2. LOCATE YOUR POSITION ON THE GROUND AND MARK YOUR POSITION ON THE MAP.

STEP 3. LAY A STRAIGHT EDGE (I.E. PROTRACTOR) WITH ONE END AT YOUR POSITION AS A PIVOT POINT, THEN ROTATE THE STRAIGHT EDGE UNTIL YOU SIGHT THE UNKNOWN POINT ALONG THE EDGE.

STEP 4. DRAW A LINE ALONG THE STRAIGHT EDGE.

STEP 5. REPEAT PROCEDURES 1 THRU 4 AT AN ALTERNATE KNOWN POSITION.

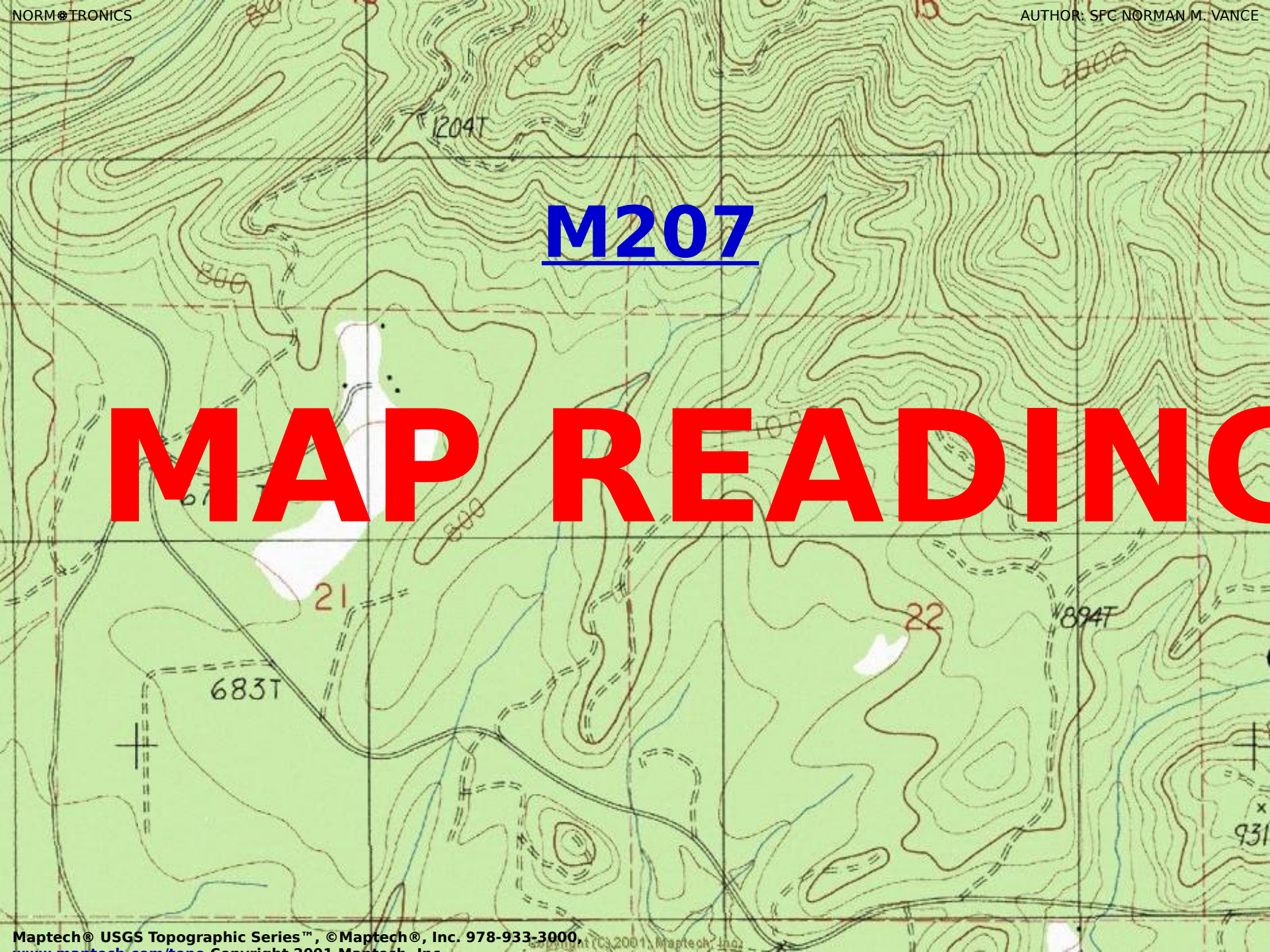
STEP 6. THE INTERSECTION OF LINES IS THE LOCATION OF THE UNKNOWN POINT.

STEP 7. AGAIN, CHECK FOR ACCURACY, YOU MAY USE A THIRD POSITION.

AUTHOR: SFC NORMAN M. VANCE

M207

MAP READING



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ENABLING LEARNING OBJECTIVE #10

ACTION: LOCATE AN UNKOWN POINT ON A MAP BY RESECTION.

CONDITIONS: IN A CLASSROOM ENVIRONMENT, GIVEN A STANDARD 1:50,000 SCALE MILITARY MAP OF 'TENINO', THE LOCATION OF TWO KNOWN POINTS, A STRAIGHT EDGE, COORDINATE SCALE AND A PROTRACTOR (GTA 5-2-12), A PENCIL, AND TWO TERRAIN FEATURES VISIBLE FROM YOUR LOCATION AND IDENTIFIABLE ON THE MAP.

STANDARDS: DETERMINE THE 100,000 METER SQUARE IDENTIFICATION LETTERS AND SIX-DIGIT COORDINATES OF YOUR LOCATION TO WITHIN 100 METERS OF THE ACTUAL GRID COORDINATES.

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RESECTION

- DETERMINE THE POSITION OF AN UNKNOWN POINT BY SIGHTING ON AT LEAST TWO, BUT PREFERABLY THREE, KNOWN POSITIONS.
- DETERMINE THE AZIMUTHS FROM THE UNKNOWN POINT TO THESE POSITONS.
- PLOT THE BACK AZIMUTHS FROM THE KNOWN POSITONS TO LOCATE YOUR UNKNOWN POSITION BY THEIR INTERSECTION.

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BACK AZIMUTH

RULE #1: IF THE AZIMUTH IS MORE THAN 180 DEGREES, THEN SUBTRACT 180 DEGREES.

EXAMPLE: AZIMUTH 215 DEGREES

-180 DEGREES

BACK AZIMUTH 35 DEGREES

RULE #2: IF THE AZIMUTH IS 180 DEGREES OR LESS, THEN ADD 180 DEGREES.

EXAMPLE: AZIMUTH 180 DEGREES

+180 DEGREES

BACK AZIMUTH 360 DEGREES

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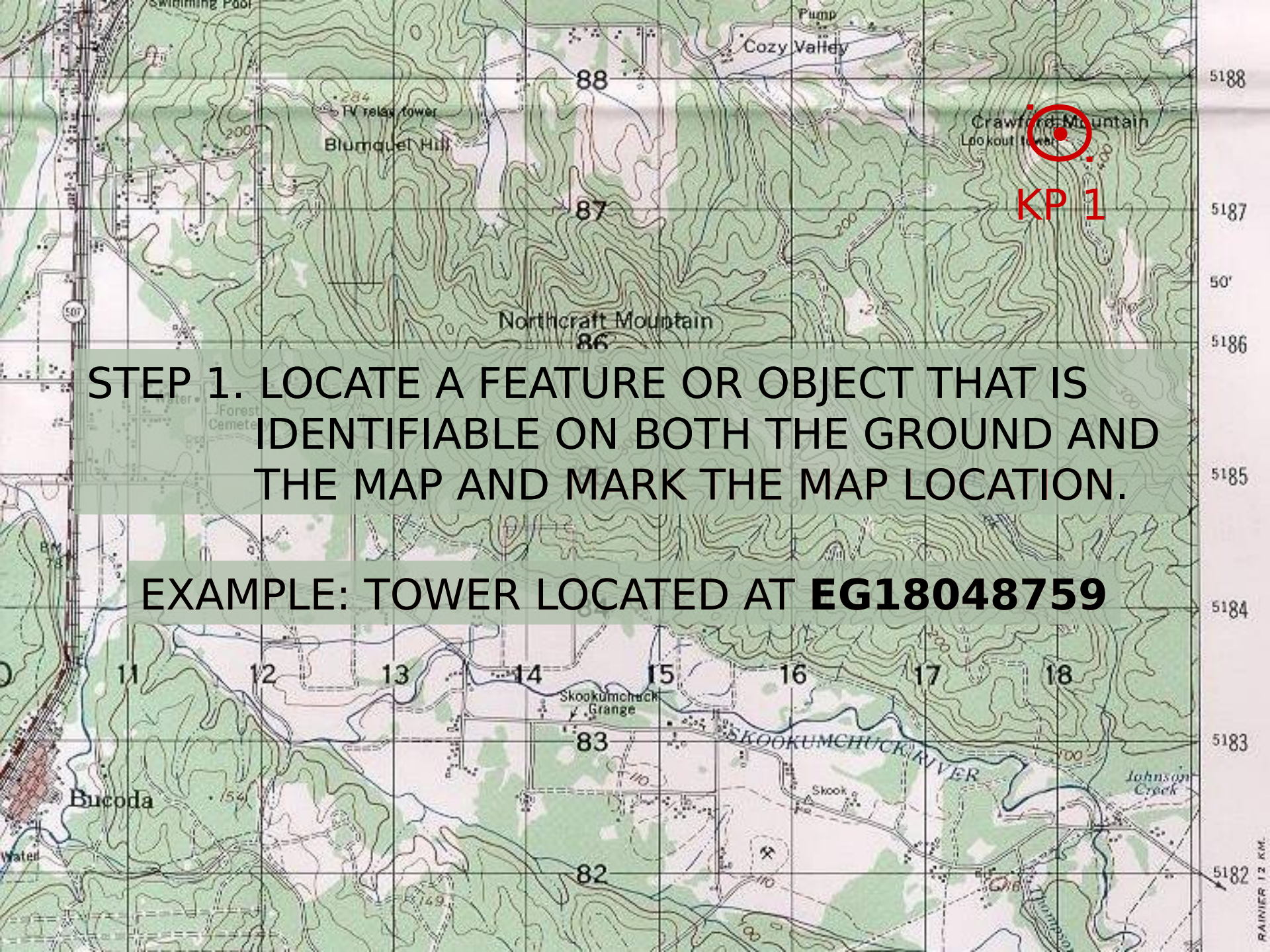
STEP 1. LOCATE A FEATURE OR OBJECT THAT IS IDENTIFIABLE ON BOTH THE GROUND AND THE MAP AND MARK THE MAP LOCATION.

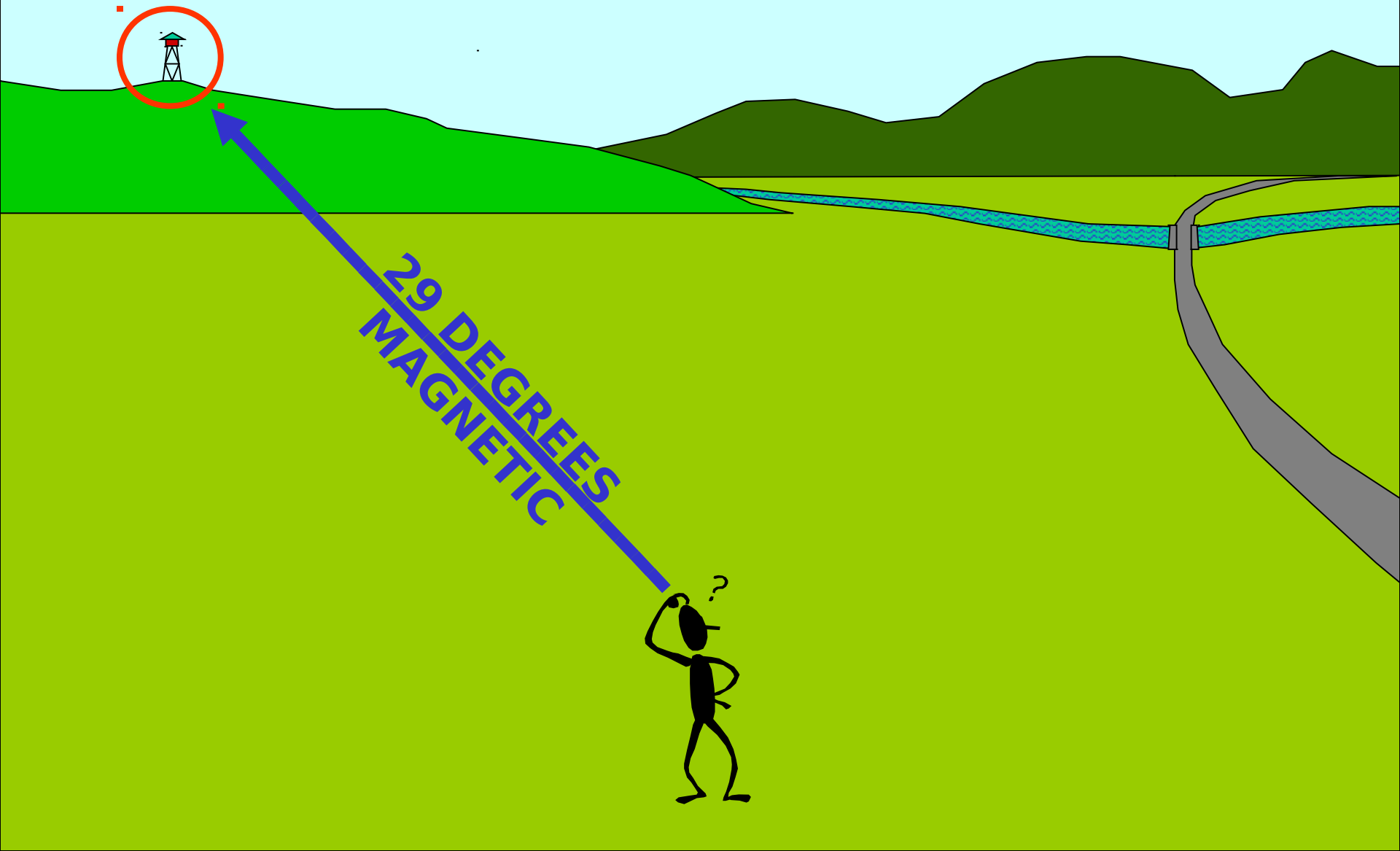
EXAMPLE: TOWER LOCATED AT **EG18048759**



STEP 1. LOCATE A FEATURE OR OBJECT THAT IS IDENTIFIABLE ON BOTH THE GROUND AND THE MAP AND MARK THE MAP LOCATION.

EXAMPLE: TOWER LOCATED AT **EG18048759**

STEP 2. MEASURE THE MAGNETIC AZIMUTH TO THE KNOWN POSITION AND CONVERT THE MAGNETIC AZIMUTH TO A GRID AZIMUTH.



STEP 2. MEASURE THE MAGNETIC AZIMUTH TO THE KNOWN POSITION AND CONVERT THE MAGNETIC AZIMUTH TO A GRID AZIMUTH.

MAGNETIC AZIMUTH: 29 DEGREES

EASTERLY G-M ANGLE: +21 DEGREES

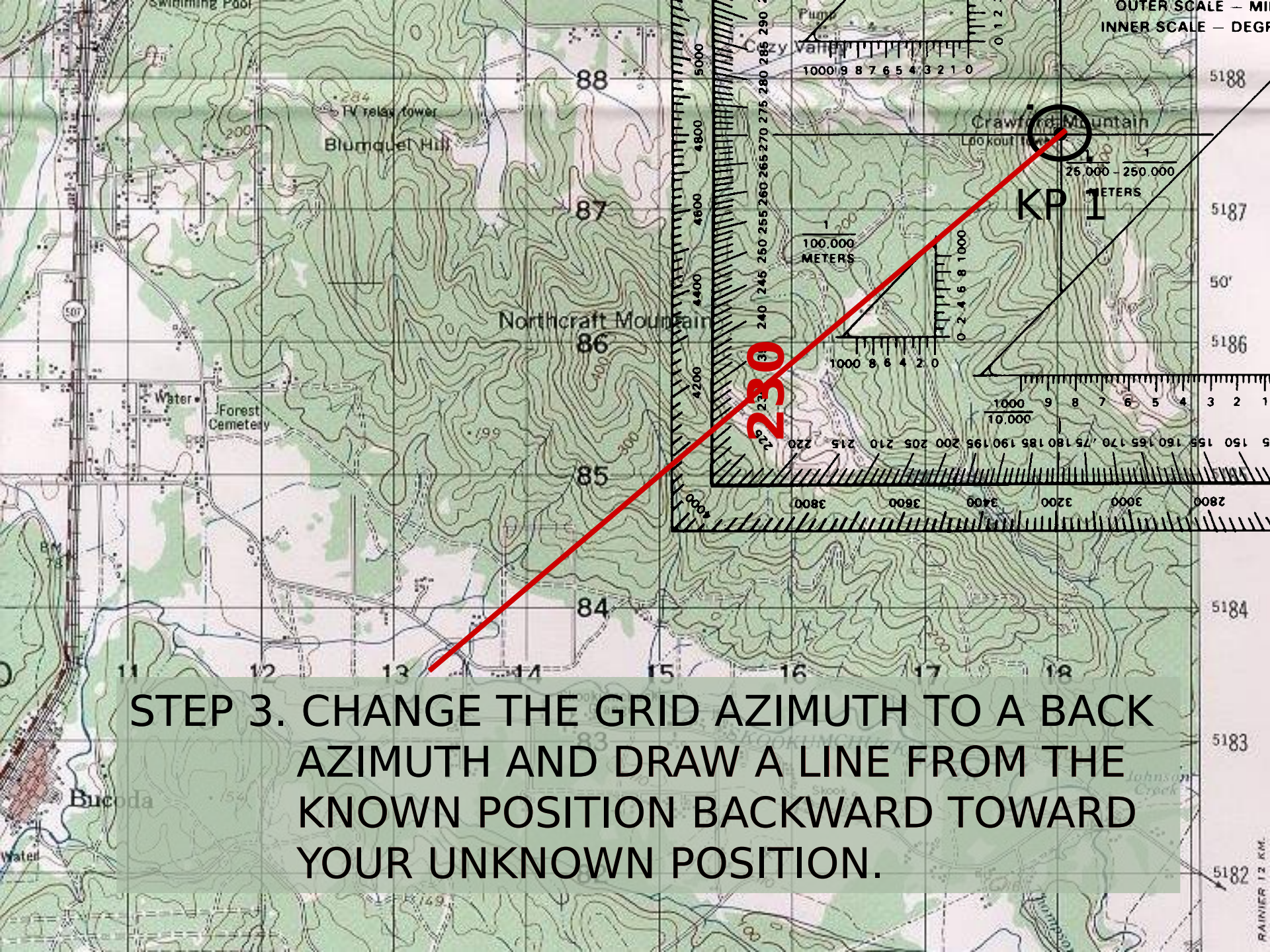
GRID AZIMUTH: 50 DEGREES

STEP 3. CHANGE THE GRID AZIMUTH TO A BACK AZIMUTH AND DRAW A LINE FROM THE KNOWN POSITION BACKWARD TOWARD YOUR UNKNOWN POSITION.

GRID AZIMUTH: 50 DEGREES

ADD: +180 DEGREES

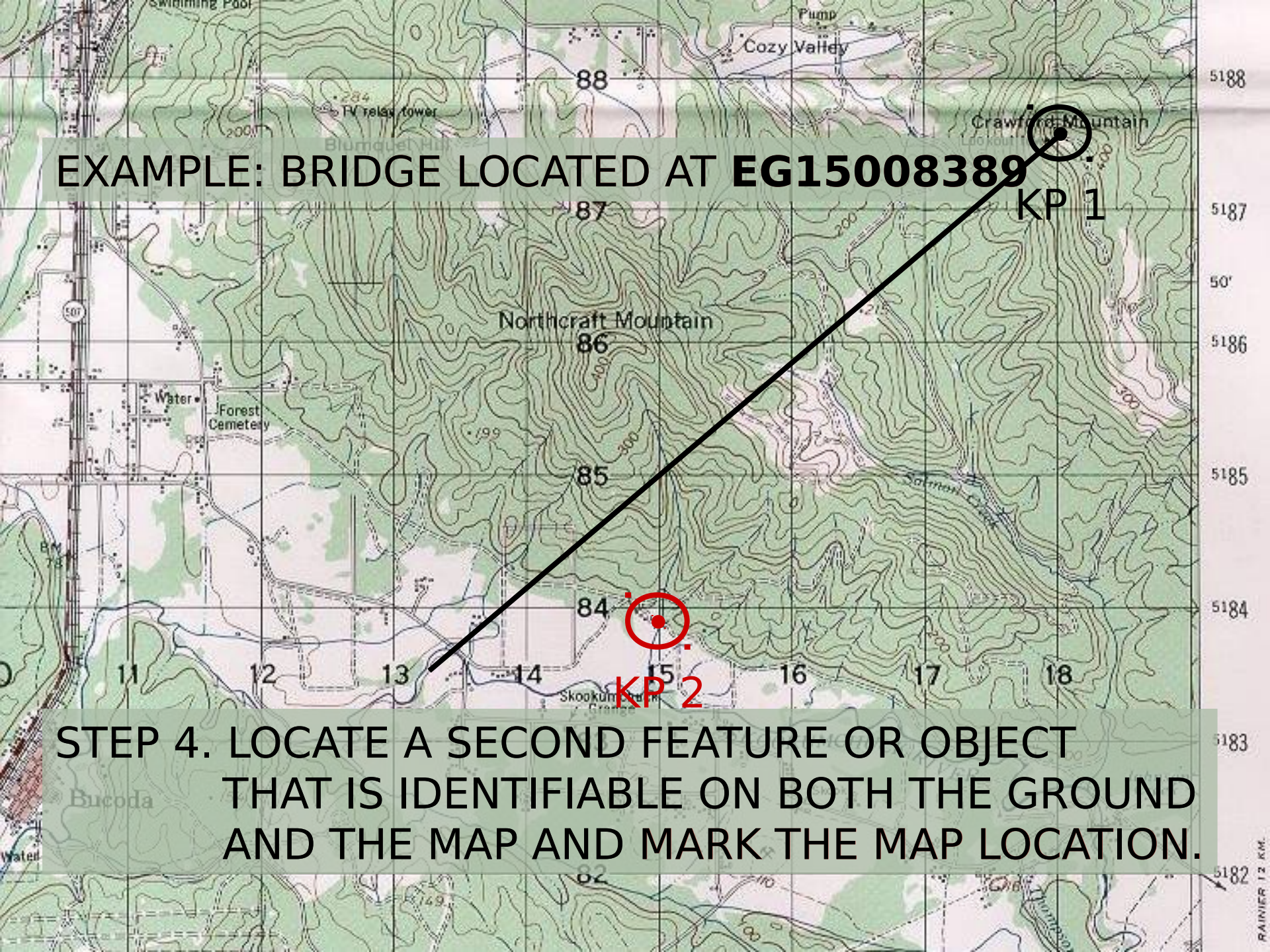
GRID BACK AZIMUTH: 230 DEGREES



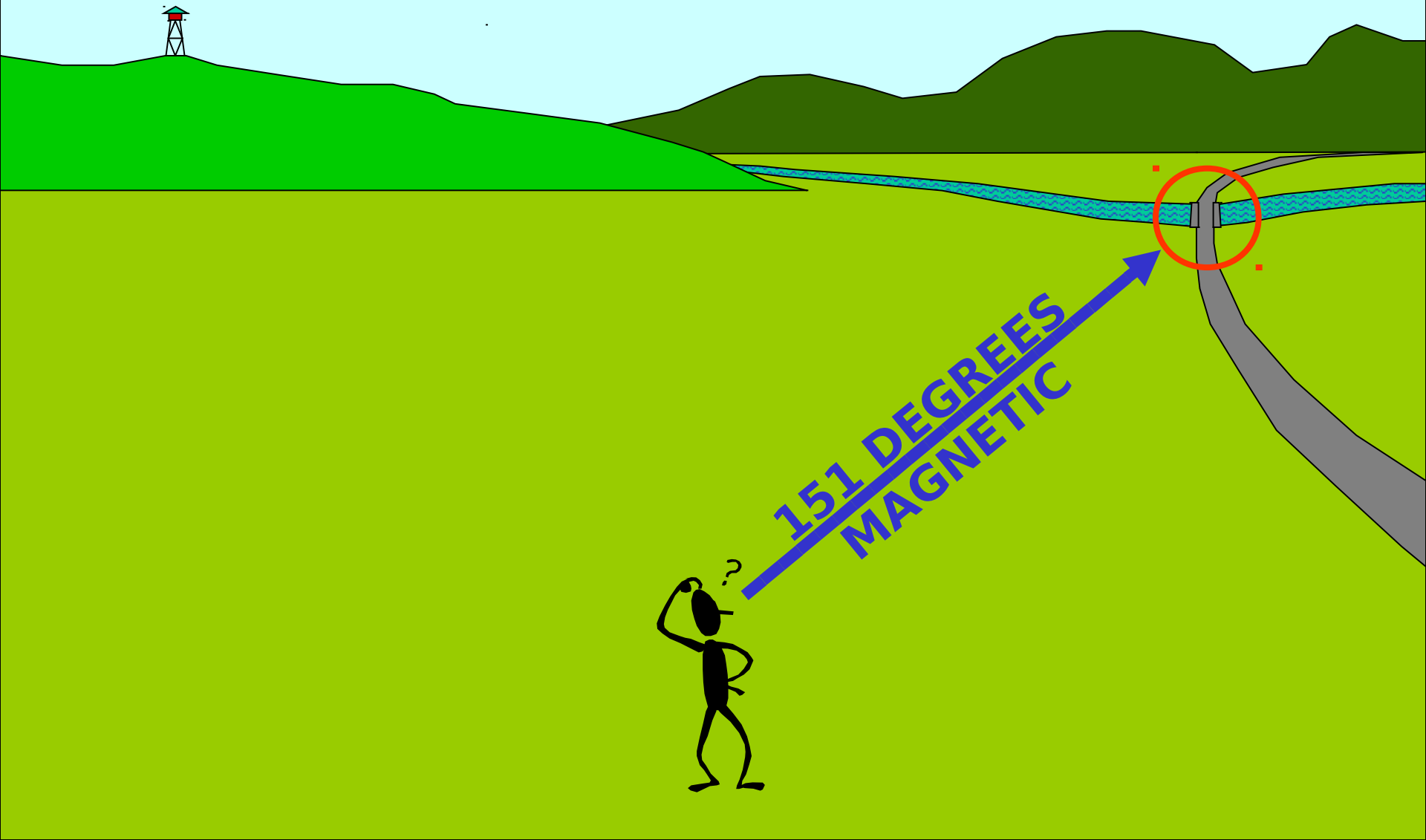
STEP 3. CHANGE THE GRID AZIMUTH TO A BACK AZIMUTH AND DRAW A LINE FROM THE KNOWN POSITION BACKWARD TOWARD YOUR UNKNOWN POSITION.

STEP 4. LOCATE A SECOND FEATURE OR OBJECT THAT IS IDENTIFIABLE ON BOTH THE GROUND AND THE MAP AND MARK THE MAP LOCATION.

EXAMPLE: BRIDGE LOCATED AT **EG15008389**


EXAMPLE: BRIDGE LOCATED AT **EG15008389**
KP 1
KP 2
Cozy Valley
Crawford Mountain
Northcraft Mountain
Forest Cemetery
Water
Swimming Pool
Pump
TV relay tower
Blumquel Hill
Bucoda
88
87
86
85
84
11
12
13
14
15
16
17
18
5188
5187
5186
5185
5184
5183
5182
STEP 4. LOCATE A SECOND FEATURE OR OBJECT THAT IS IDENTIFIABLE ON BOTH THE GROUND AND THE MAP AND MARK THE MAP LOCATION.

STEP 5. MEASURE THE MAGNETIC AZIMUTH TO THE SECOND KNOWN POSITION AND CONVERT THE MAGNETIC AZIMUTH TO A GRID AZIMUTH.



STEP 5. MEASURE THE MAGNETIC AZIMUTH TO THE SECOND KNOWN POSITION AND CONVERT THE MAGNETIC AZIMUTH TO A GRID AZIMUTH.

MAGNETIC AZIMUTH: 151 DEGREES

EASTERLY G-M ANGLE: +21 DEGREES

GRID AZIMUTH: 172 DEGREES

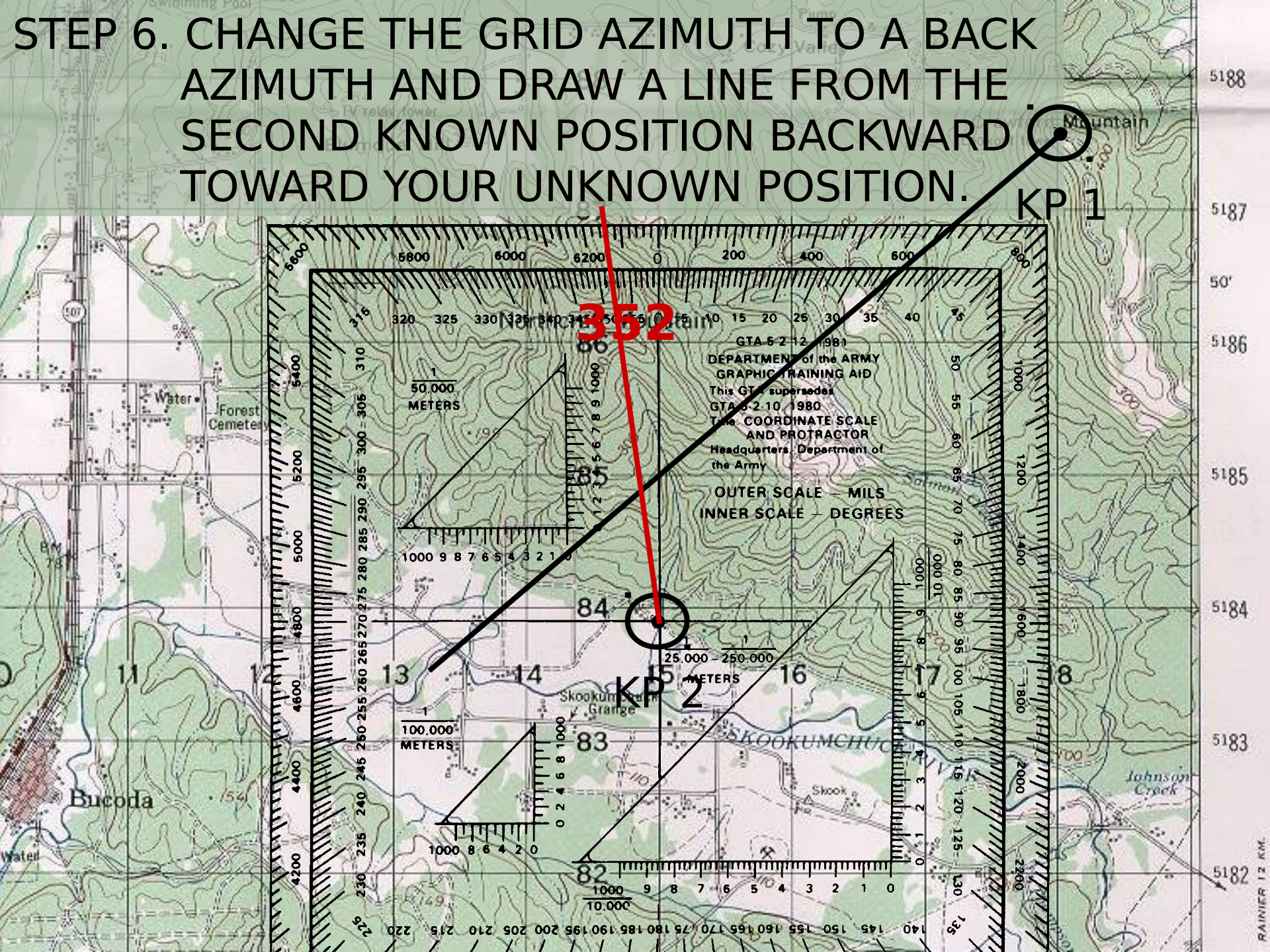
STEP 6. CHANGE THE GRID AZIMUTH TO A BACK AZIMUTH AND DRAW A LINE FROM THE SECOND KNOWN POSITION BACKWARD TOWARD YOUR UNKNOWN POSITION.

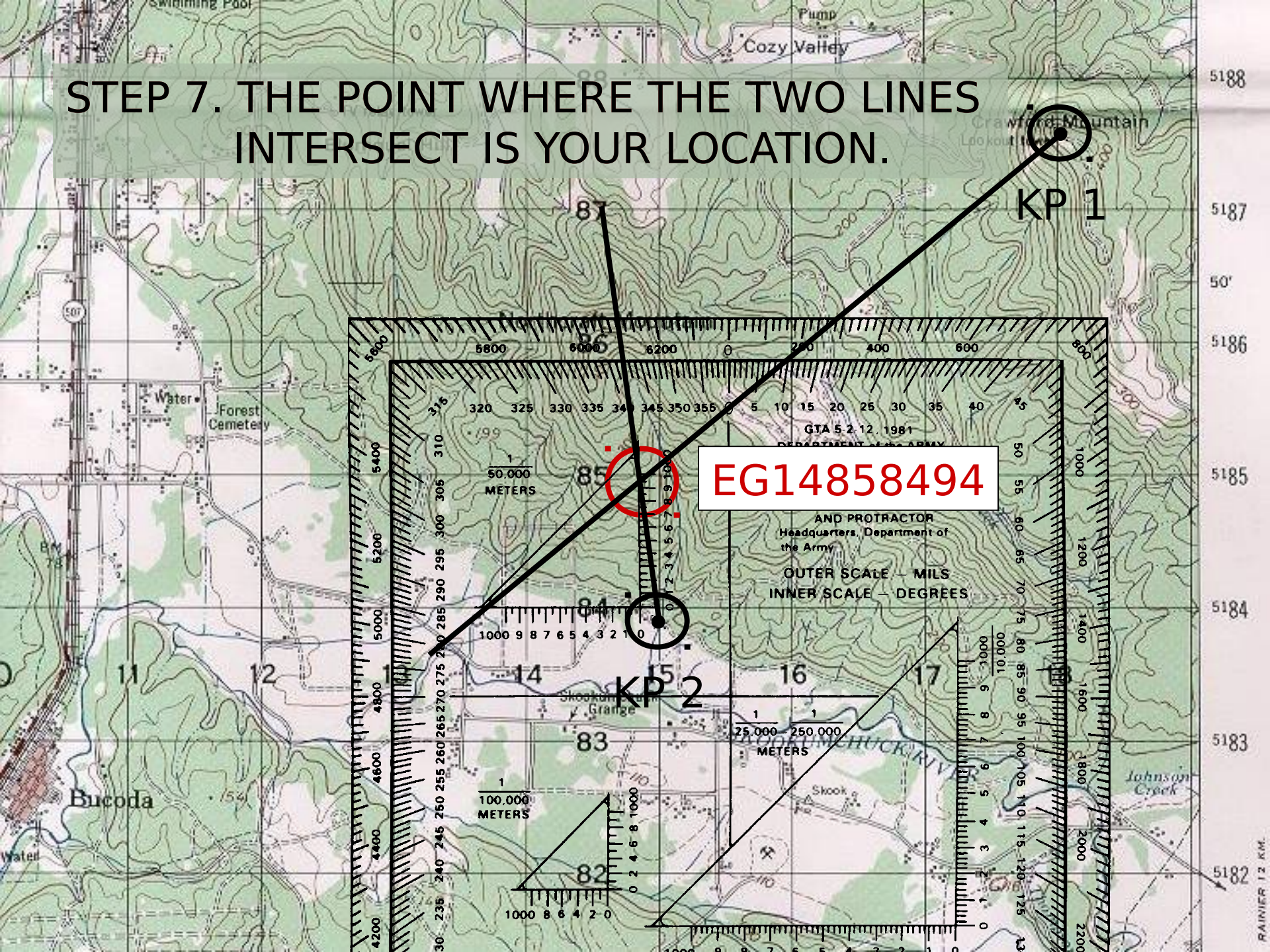
GRID AZIMUTH: 172 DEGREES

ADD: +180 DEGREES

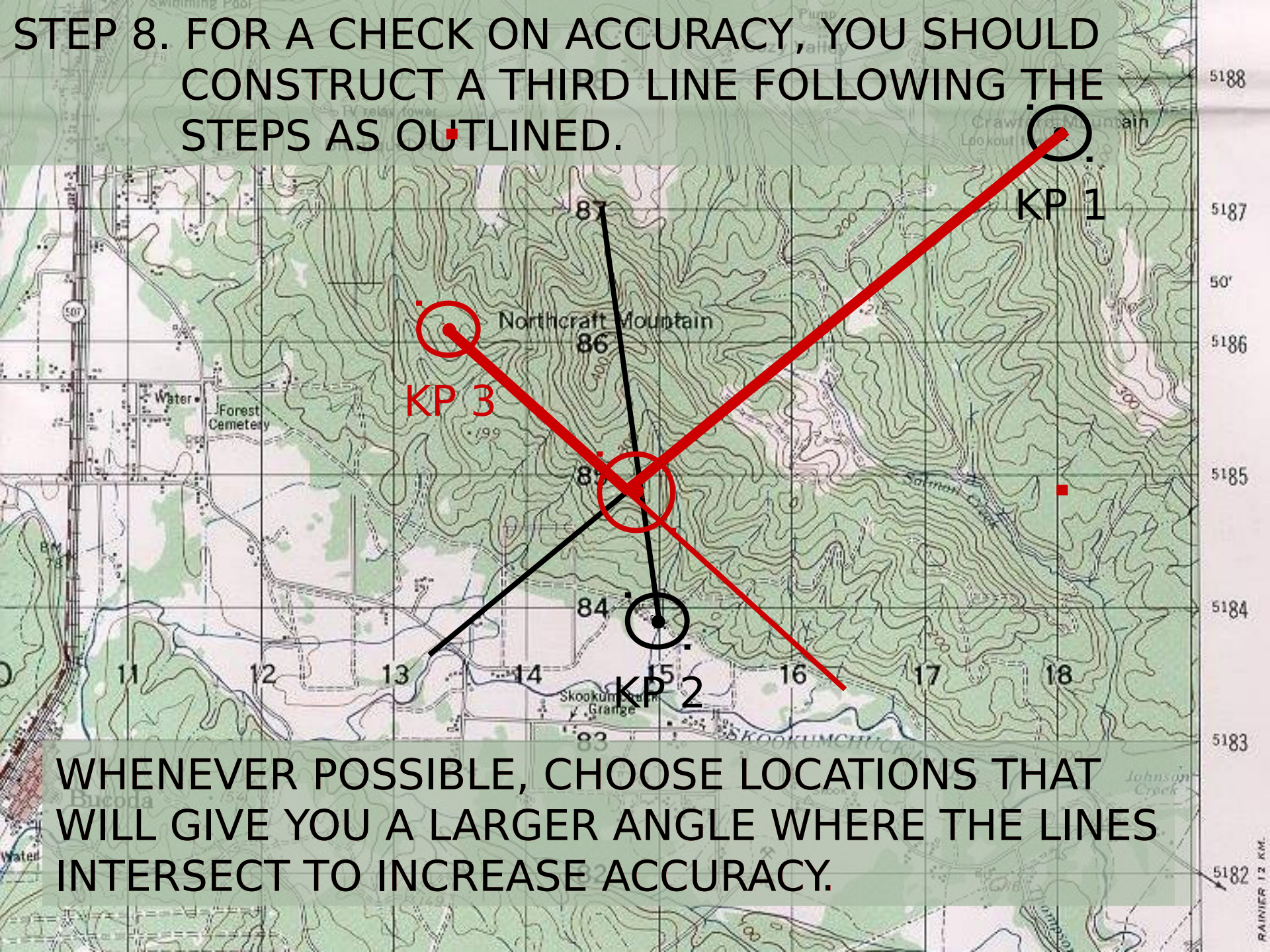
GRID BACK AZIMUTH: 352 DEGREES

STEP 6. CHANGE THE GRID AZIMUTH TO A BACK AZIMUTH AND DRAW A LINE FROM THE SECOND KNOWN POSITION BACKWARD TOWARD YOUR UNKNOWN POSITION.




STEP 7. THE POINT WHERE THE TWO LINES INTERSECT IS YOUR LOCATION.
KP 1
KP 2
EG14858494
Cozy Valley
Pump
Swimming Pool
Water
Forest Cemetery
Bucoda
Skookum Grange
Skook
Johnson Creek
GTA 5-2 12, 1981
AND PROTRACTOR
Headquarters, Department of the Army
OUTER SCALE – MILS
INNER SCALE – DEGREES
1/50,000 METERS
1/25,000 – 1/250,000 METERS
1/100,000 METERS
5188
5187
5186
5185
5184
5183
5182
50'

STEP 8. FOR A CHECK ON ACCURACY, YOU SHOULD CONSTRUCT A THIRD LINE FOLLOWING THE STEPS AS OUTLINED.



WHENEVER POSSIBLE, CHOOSE LOCATIONS THAT WILL GIVE YOU A LARGER ANGLE WHERE THE LINES INTERSECT TO INCREASE ACCURACY.

PRACTICAL EXCERCISE

WHILE ON A RECONNAISSANCE MISSION, AN ENEMY SCOUT PLATOON DETECTS YOUR SQUAD. YOU TAKE UP A DEFENSIVE POSITION AND DECIDE TO REQUEST INDIRECT FIRE SUPPORT. YOU ARE NOT SURE OF YOUR LOCTION. FROM YOUR LOCATION, YOU CAN SEE A LOOKOUT TOWER IN GRID **EG1887** AT A MAGNETIC AZIMUTH OF 110 DEGREES AND A TV RELAY TOWER IN GRID **EG1287** AT A MAGNETIC AZIMUTH OF 215 DEGREES.

QUESTION: WHAT IS YOUR LOCATION?

ANSWER: EG155897

YOU DETERMINE A DISTANCE OF 800 METERS TO THE ENEMY WITH YOUR LASER RANGE FINDER AND A MAGNETIC AZIMUTH OF 290 DEGREES.

QUESTION: WHAT IS THE GRID LOCATION OF THE ENEMY SCOUT PLATOON?

ANSWER: EG149902

PRACTICAL EXERCISES

QUESTION: YOU HAVE DETERMINED THAT THE MAGNETIC AZIMUTH FROM YOUR POSITION TO THE TV RELAY TOWER IN GRID SQUARE **EG1287** IS 3 DEGREES AND THE MAGNETIC AZIMUTH TO THE SPOT ELEVATION 199 IN GRID SQUARE **EG1385** IS 77 DEGREES. WHAT IS THE SIX DIGIT GRID COORDINATE OF YOUR LOCATION?

ANSWER: EG116856

QUESTION: THE MAGNETIC AZIMUTH FROM YOUR LOCATION TO THE WATER TOWER AT **EG093853** IS 63 DEGREES AND THE MAGNETIC AZIMUTH TO THE WATER TOWER AT **EG097827** IS 104 DEGREES. WHAT IS THE SIX DIGIT COORDINATE TO YOUR LOCATION?

ANSWER: EG063849

RESECTION WITHOUT A COMPASS

STEP 1. ORIENT THE MAP TO THE GROUND.

STEP 2. LOCATE AT LEAST TWO KNOWN POSITIONS ON THE GROUND AND MARK THEM ON THE MAP.

STEP 3. LAY A STRAIGHT EDGE (I.E. PROTRACTOR) WITH ONE END AT THE FIRST KNOWN POSITION AS A PIVOT POINT, THEN ROTATE THE STRAIGHT EDGE TOWARD YOURSELF UNTIL YOU SIGHT THE KNOWN POSITION ALONG THE EDGE.

STEP 4. DRAW A LINE ALONG THE STRAIGHT EDGE.

STEP 5. REPEAT PROCEDURES 1 THRU 4 FOR THE NEXT KNOWN POSITION.

STEP 6. THE INTERSECTION OF LINES IS THE LOCATION OF YOUR POSITION.

STEP 7. AGAIN, CHECK FOR ACCURACY, YOU MAY USE A THIRD POSITION.